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OBSTETRICS AND GYNECOLOGY

THE PATHOLOGY OF LABOR

THE USES OF ERGOT

BEING VOLUME THREE OF

A PRACTICAL TREATISE ON

OBSTETRICS

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BY

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CHAPTER I.

MATERNAL DYSTOCIA.

UNDER the term dystocia we include all the causes which may render labor difficult, impossible, or dangerous for the mother and child, and which consequently require more or less active interference on the part of the obstetrician. These causes may be grouped under the five following heads:

1. An abnormal condition of the expulsory forces, which may be exaggerated, diminished, or perverted.

2. Obstacles or malformations, that prevent the normal expulsion of the fœtus, either of the bony pelvis, in the soft parts or parturient canal, or in the vicinity of this canal.

3. Pathological conditions that render the labor dangerous for either mother or child. The foregoing are called maternal causes of dystocia. Under fœtal dystocia are included:

4. Dystocia from accidents directly connected with the fœtus (prolapse of the funis or extremities, etc.)

5. Abnormal size (partial or total) or malformation of the fœtus or its attachments.

6. Abnormal presentation or position; which may be complicated with prolapse of a limb, or of the cord.

In this chapter we will consider simply the causes which emanate from the mother.

ABNORMAL UTERINE CONTRACTIONS.

The uterine contractions may be exaggerated, diminished, or irregular: and although the exaggeration of the pains does not, as a rule, produce any other result than too rapid termination of labor, it may on account of this very fact become a source of different accidents to the mother and child, which justify us in studying it under the head of dystocia.

Excessive Contractions.

There may be actual exaggeration of the contractions, their intensity, duration, frequency, or the accompanying pain, being singly or collectively increased. It may be relative, that is to say, the contractions are of normal character, but really become too strong in consequence of the diminution of the normal resistance (large pelvis, or small fœtus), or the relaxation of the soft parts forming the canal, or because the sensibility is lessened. It is only necessary to compare labor in a primipara with that in a multipara, in order to understand that the resistance offered by the perineum plays an important part in the expulsion of the fœtus, since in cases where the perineum offers only a slight resistance, normal uterine contractions will, by reason of the absence of the usual barrier, become too violent, and under certain conditions cause precipitate labor with its consequences. Excessive contractions are especially observed near the time of complete dilatation, and they go on increasing until the end of the labor, leaving the woman no interval of rest. They are then frequent, violent, and prolonged, while there is an absence of the intermission between the pains that characterizes normal labor; the uterus appears to be in a state of tenesmus. The pains may be normal, but the os, vagina, perineum, and vulva may stretch so easily, or the child may be so small, that it is rapidly expelled. Excessive contractions are observed in delicate, as well as in robust women; they sometimes appear to be an hereditary peculiarity. They are due, in general, either to exaggeration of the contractility of the uterus, or to excessive hypertrophy of its muscular fibres.

In consequence of the too rapid expulsion of the fœtus, rupture of the perineum, vagina, or even of the uterus, (cervix,) may occur, while the latter organ is affected by a subsequent inertia, that leads to retention of the placenta, hemorrhage, and inversion. The fœtal circulation may be fatally obstructed by excessive uterine contractions, or the child may be expelled upon the ground, and thus be injured; the cord may rupture, and the placenta be detached. Although the prognosis is not positively bad, it is far from being insignificant.

Treatment.—This consists, in the first place, in confining the woman to her bed at the outset of labor, and insisting on absolute repose and no straining. If her condition permits, chloroform or chloral may be administered. Some writers advise rupture of the membranes, of which we disapprove. Opium is useful, especially when administered subcutaneously. If the lower uterine segment tends to become prolapsed, it should be held up with the fingers. If the entire organ is prolapsed, it must be supported by a bandage, and replaced immediately after delivery. At the time of delivery we should be very watchful in order to foresee, and to recognize when they appear, uterine inertia and hemorrhage, so as to treat them instantly. Finally, after a precipitate labor the woman should be kept in bed for a long time, and should not be allowed to rise until involution is well advanced; this process seems to take place more slowly in such cases. Puerperal troubles are also common.

Feeble Contractions.

Feeble contractions are more commonly met with than excessive, but, as Schroeder has justly observed, it is difficult to establish a rule as to what constitutes feeble pains. Very slight pains may, in a given case, be sufficiently powerful to allow labor to terminate, while very strong contractions may be too feeble to cause the expulsion of the fœtus. On the other hand, normal pains are characterized by their increase in strength and duration as labor advances. Now this peculiarity may be absent, the pains are too feeble, short and infrequent, or are sometimes almost entirely absent. This constitutes feebleness of the uterine contractions.

This deficiency may appear at any stage in the labor, and may persist throughout the entire period, or, it may be confined to a single stage, that of dilatation, expulsion, or delivery; all degrees may exist, from simple irregularity to complete and prolonged suspension of the entire contracting force of the uterus. Naegelé and Grenser recognize three varieties of inefficient pains, viz.: 1. Uterine inertia, in which the pains are weak, and reappear after long intervals. 2. Atony of the uterus, where they grow more and more feeble, and finally disappear entirely. 3. Paralysis of the uterus, where the organ may be completely relaxed. Cazeaux divides them into: Pains that are feeble at the beginning of labor; those which begin strongly, but subsequently diminish, or disappear entirely; and pains which present marked irregularity in their duration, intensity and recurrence. Jacquemier defines inefficient pains as those which are "unable to overcome the normal resistance to the expulsion of the fœtus." The English expression "tedious labor" is peculiarly appropriate.

If feebleness of the contractions is present during the first stage, complete dilatation may require from twelve hours to several days. The women may have regular pains, but these are separated by very long intervals, or the pains recur frequently, but are brief and slightly marked; again, they may be irregular in their appearance, duration and intensity.

Two or three pains rapidly succeed one another, then comes an interval of repose, a fresh pain occurs, and is succeeded by slight and short ones, dilatation being discouragingly slow. If dilatation is finally accomplished, it seems as if the uterus had exhausted all its energy, the pains cease, the membranes do not rupture, and labor is prolonged.

In another case the first stage proceeds regularly, but as soon as dilatation has been completed, the pains become infrequent and feeble, the stage of expulsion being indefinitely delayed. If the membranes have ruptured, the presenting part of the fœtus becomes the seat of a considerable swelling, which may lead the attendant to think that the child has descended, when in reality it remains stationary.

Although retarded labor is usually borne well during the first stage, it is not the case during the second. If the latter is prolonged, in addition to the fatigue produced by the length of the labor, there is often vomiting, fever, a hot and dry skin, uneasiness, anxiety, tremor, a dry tongue, hot vagina, etc. The fœtus is also affected, as shown by disturbance of the heart, and may perish purely from the prolongation of the labor. The long contact of the fœtal head with the same point in the pelvis may cause sloughing of the maternal tissues, with the subsequent formation of fistulæ, not to speak of the favorable condition in which the exhausted woman is placed for the occurrence of future septic infection.

Causes.—These are often obscure, and feeble pains may be observed in robust, as well as in delicate females, in the young, as well as in those more advanced in years. They seem to be of more frequent occurrence in primiparæ than in multiparæ, however, and are often seen in women of marked adipose development. Sometimes, the uterine inertia results from a condition of general debility, caused by previous diseases, hemorrhages, or bad hygienic surroundings. The uterus may itself be inert, or the feebleness may be to a certain extent hereditary, or acquired in consequence of severe labors, repeated abortions, or chronic leucorrhœa. Other causes are premature rupture of the membranes, hyper-distension of the uterus (twin pregnancy, hydramnios, fibrous tumors, etc.), death of the fœtus, prolongation of the first stage, and endometritis (Grenser). To these may be added uterine congestion and inflammation, biliousness, gastric irritation, distension of the bladder, and mental emotions (fright, anger). The arrival of the physician, or the presence of obnoxious persons, may produce the same effect, although in this case the cessation of the pains is only temporary.

Prognosis.—1. *For the Mother.*—This is usually without gravity during the first stage, when the effects are limited to the fatigue, agitation, and impatience experienced by the patient; but the prognosis may become more serious if the period is so extended that she is deprived of sleep, loses her appetite, and becomes thoroughly exhausted. During the second stage it becomes still more serious, because, aside from the exhaustion of the mother, the pressure of the fœtal head may cause sloughing, with resulting fistulæ or other grave effects. All writers agree in regarding retarded labor as one of the most potent causes of the serious puerperal sequelæ, without mentioning primary accidents (hemorrhage, etc.), which may occur at the time of delivery.

2. *For the Child.*—As long as the membranes remain intact, feeble pains seem to be innocuous no matter how prolonged the labor may be. Thus, among 133 cases collected by Tarnier and others, in which the first stage was prolonged from twenty-four to sixty hours, only eight children were dead-born. After the rupture of the membranes, however, and when dilatation is complete, the case is different. Although the fœtus may not be affected for a long time, because of the relaxed condition of the uterus, if the stage of expulsion is prolonged beyond eight or ten hours the placental circulation is disturbed, the heart-beats become irregular, and the children perish in a considerable number of cases. This period, eight to ten hours, seems to us too long, although fixed by Jacquemier, and, in our opinion, we should apply the forceps when the head has been arrested for an hour or two after reaching the pelvic floor, and thus both snatch the child from the perils that threaten it, and relieve the woman of unnecessary suffering.

Treatment.—As Grenser justly observes, we must see if the retardation of the labor is really due to the inefficient contractions of the uterus, and if so, we must ascertain the cause of the anomaly. The uterus may be simply reposing, and in endeavoring to awaken the contractions, we may exaggerate them. The main indication is to control the forces of the uterus at the outset, so that they may be sufficient for each stage of the labor. Do not impose any arbitrary position upon the patient, but allow her to assume the one that is most agreeable to her. Some women have stronger pains when lying upon the back, others when standing. Give her a little light nourishment (tea, bouillon), and encourage her kindly, but do not fix any time for the termination of the labor. Avoid frequent examinations, as they are both useless and wearisome; note the condition of the bladder and rectum, and empty them if necessary. If the woman is weak, give light stimulants. If she is wearied by ineffectual pains, it is a good plan to give her fifteen or twenty drops of laudanum, or a drachm of chloral, by the rectum. Warm vaginal douches and baths will sometimes give great relief. *Above all, wait*; do not be in a hurry to interfere, but gain time by soothing the patient. If the pains continue, but are feeble and irregular, the membranes may be ruptured, but only under the following conditions: 1. The os must be dilated to some extent, and the cervix must not be rigid. 2. Both the position and presentation must be favorable. 3. The pelvis must be well-proportioned. 4. There must be no complications, such as prolapse of the cord, or of a limb. If accomplished with care, and with due regard to these conditions, the operation is often very useful. Do not act too hastily; rash interference is, in the great majority of cases, more dangerous than expectant treatment.

For feeble pains during the second stage of labor, a number of remedies have been suggested; they may be described as mechanical and dynamical. Among the former is posture; the woman may be caused to stand and walk about, but this often increases her fatigue and effects nothing. The Germans have recommended the use of Braün's colpeurynter, and the introduction of a bougie into the uterine cavity; the latter method is often useful, but it is sometimes inconvenient to leave a foreign body in the cavity for several hours. Kristeller has suggested uterine expression, a manipulation which consists in grasping the uterus with both hands, in such a way that the ulnar border of each hand is turned toward the pelvis, while the palm encircles the fundus on each side, and exerting firm pressure downwards, at the same time squeezing the organ between the hands. The pressure is maintained from five to eight seconds, then the operator rests for half a minute (sometimes two or three minutes), when the same manœuvre is repeated, and this is done from ten to twenty or forty times.

If the patient is very sensitive it may be necessary to administer chloroform. Suchard mentions the following indications for expression: 1. Arrest of labor from uterine inertia, when the os is not sufficiently dilated to allow the introduction of the forceps. 2. Spasmodic contractions of the os. 3. Arrest of the head, in breech presentations, after the trunk has been expelled, whether this arrest is due to contraction of the cervix or to resistance on the part of the perineum.

We believe that these propositions are exactly opposed to all the principles of rational practice. If the uterine contractions are arrested at a period when the os is not sufficiently dilated to permit the introduction of forceps, it is better to wait if the indications are not urgent, or to dilate rapidly and apply forceps if they are. Kristeller's method seems to oppose rather than to favor dilatation when the cervix is the seat of spasmodic contraction, because by exciting the uterus to fresh action we only increase the irritability of the circular muscular fibres. Finally, the forceps applied in practised hands are preferable to expression as a means of overcoming the resistance of the perineum. The hot vaginal douche, repeated two or three times and continued for about ten minutes, is a useful agent.

Among the dynamical means may be mentioned cinnamon, borax, ergot, especially the latter. The latter possesses advantages, but its use is dangerous for the mother, in that it produces tetanic contraction of the uterus, and for the fœtus, since it causes profound disturbance of the placental circulation. Ergot should be absolutely rejected during labor, not only in the first stage, but in the second and during the third, its use being confined to the period after the expulsion of the placenta. This is the dictum of Pajot, who affirms that ergot should not be administered until the uterus is *entirely emptied of its contents, including the fœtus, placenta, and blood-clots.* Cannabis Indica, pulsatilla, uva ursi, and pilocarpine, have been recommended. Electricity was first proposed by Herder in 1803; was first employed by Hönninger and Jacoby, and its use was revived by Saint Germain in 1869. The latter experimented with galvanism, employing the Ruhmkorff apparatus. He decided that the galvanic current caused a notable increase in the number and strength of the uterine contractions, that the os dilated steadily and rapidly under its influence, and that neither the mother nor the child suffered harm, while the placenta was invariably expelled spontaneously and immediately after the birth of the child. Apostoli stated to the Academy of Medicine, in 1881, that he was accustomed to use the faradic current as soon as the child was delivered, introducing one pole into the uterine cavity. He claimed that involution was hastened in this way, while no bad results followed. It is precisely in the conditions described by Apostoli as favorable for the employment of electricity, that we regard its use as unjustifiable. The woman should be kept absolutely quiet during the five or six days following delivery; such interference as he describes is not only useless, but dangerous.

The best way to accelerate labor during the second stage is to terminate it either by extraction or by the forceps, but we must not interfere too hastily. We wait from three to six hours after the rupture of the membranes, according to the condition of the mother and child, and the elevation of the presenting part. When the head has remained for two hours in the vagina, without making any progress, we do not wait longer, but deliver with the forceps, even when the child is in no danger, in order to spare the mother from unnecessary prolongation of the labor. If the child is in peril, we of course interfere sooner. This problem becomes one of the most difficult of solution, when the life of the child is threatened, before the os is dilated. In this case we should carefully try expression, but if the latter was not immediately successful, and the disturbance of the fœtal circulation increased, we should not hesitate to incise the cervix in one or two places, and to extract the child. But such cases are rare, because, as we have said, feebleness of the uterine contractions does not affect the fœtus during the first stage, while during the second stage extraction and completion of the labor are not, as a rule, attended with serious difficulties.

[For ineffective pains during the first stage of labor, we know of nothing which will give better results than chloral. This drug regulates the pains, increases the interval between them, gives the mother rest, and thus restores her nervous force. We would administer the drug in fifteen grain doses every quarter of an hour, for four doses, or else give at once thirty grains *per rectum*, repeated in one half hour.

For ineffective pains during the second stage, twenty grains of quinine have often increased the pains in our experience, and, in addition, we would strongly recommend the use of a mild faradic current, one electrode held by the patient, the other moved over the abdomen.—Ed.]

Abnormal Contractions.

The uterine contractions may be misdirected (perverted) or irregular in their course, or partial, only one portion of the uterus contracting, or the fundus alone may contract, the inferior segment being quiescent. Sometimes the entire organ remains in a state of tetany, sometimes the fundus, the inferior segment, or one horn contracts at irregular intervals, when the organ presents a nodular shape. No impulse is communicated to the fœtus, and the membranes do not protrude during the pains, while the cervix remains hard, retracted and undilated, and is very sensitive.

If this condition persists, and the contraction is confined to the region of the isthmus, hour-glass stricture results; if it involves the entire uterus, it is called tetanus uteri. As a rule, such spasmodic contractions only appear towards the end of the period of dilatation; they sometimes occur after the passage of the head, and are confined to the region of the os internum, where the fœtus is grasped like a stud in a button-hole. The stricture may be at the os externum. When very violent, spasmodic contractions are attended with extreme pain, great agitation and fever; the genitals become hot and sensitive. The pain extends to the loins, thighs, and entire abdomen, the patients complain of cramps and reflex pains, while in some cases delirium and convulsions may occur. In spite of the violence of the pains, labor makes no progress.

Causes.—Although they may be due to some extent to the general condition of the patient, there are two agents that are particularly responsible, ergot and unskillful excitation of the uterus, and especially of the cervix. How often does the injudicious use of ergot give rise to this spasmodic retraction, not only of the cervix, but of the entire uterus? How often are frequent examinations, excessive friction of the uterus, and awkward attempts at version, applying the forceps, and hastening delivery, followed by consequences extremely serious to the mother.

Treatment.—Seek for the cause of the spasmodic contraction, and apply one of the following remedies, as it may be suitable: Dover's powder, laxatives, ipecac, in hourly doses of from ⅓ to 1⅔ grains, enemata containing antispasmodics or laudanum, valerian, and camomile, warm injections or baths, and applications of belladonna ointment to the os. Lebert advises injections of morphine; Breslau injections of atropine; bleeding up to the point of syncope has been recommended. The best remedies are chloral (by the rectum) during the first stage, and chloroform in the second. Do not practise manual dilatation, but incise the cervix if it becomes necessary to interfere immmediately in the interest of the child.

[Instead of incising the cervix we should be in favor of chloroforming the patient, and gently dilating the cervix by means first of one finger and then another. This method is warmly commended by Sinclair, of Boston, Gillette, of New York, and others. It has answered us well.—Ed.]

Irregular Contraction of the Abdominal Muscles.—Fracture of the Sternum. —Subcutaneous Emphysema.

The contractions of the abdominal muscles are partly subject to the patient's will, and it is common to see women making violent efforts, and exaggerating these contractions. Fracture of the sternum may rarely result from excessive straining; subcutaneous emphysema, following rupture of the pulmonary vesicles, is not so rare. It usually appears on the neck, face and chest. Haultcoeur reports 11 cases, and we have seen 2. This emphysema is usually of no significance when it extends to the mediastinum and neck, but when it is confined to the pulmonary parenchyma, the result may be fatal.

The abdominal contractions may be too feeble, either because of the severe pains, or because the women are weakened by pre-existing diseases (cardiac, pulmonary, etc.) Paraplegia sometimes plays an important part. Although feebleness of the abdominal contractions is insignificant in itself, when associated with ineffectual uterine contractions it may retard labor, and thus constitute an indication for artificial delivery.

MALFORMATION OF THE PELVIS.

Whenever the pelvis varies from the normal type to such an extent as to render labor difficult or dangerous for the mother, the child, or both, it is said to be malformed. Deviations from the normal may exist in the form, structure, and dimensions of the pelvis, or in the direction of its planes and axes. There are accordingly three principal varieties, pelves that are too large, those that are too small, and those having an abnormal inclination. The second variety is by far the most important.

Abnormally large Pelves.

These preserve their relative proportions, their only striking features being the increase in their diameters, and the thickness and solidity of their walls. They are met with in females of large stature, also in those of small or medium size. Burns has described two pelves in which each of the diameters was increased about four-fifths of an inch; De la Tourette saw one in which the antero-posterior diameter at the brim measured nearly six inches, the transverse nearly seven inches, and the corresponding diameters of the inferior strait nearly six inches. Depaul gives

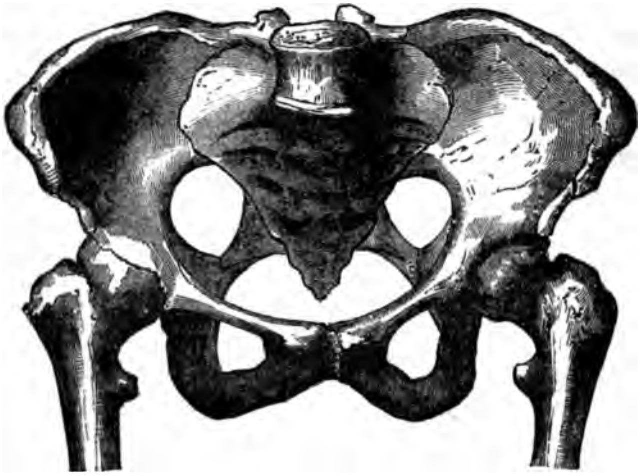
FIG. 1.—ABNORMALLY LARGE PELVIS. (*Depaul.*)

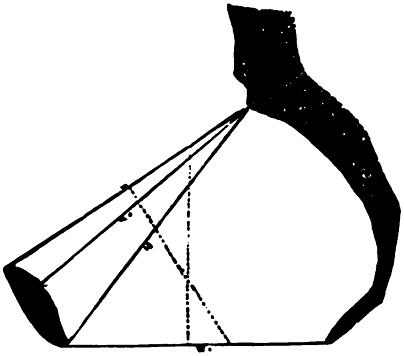
FIG. 2.—LARGE PELVIS (DIAGRAMMATIC.) (*Pinard.*)

the following dimensions of a specimen in his collection: Antero-posterior diameters, 5.2, 4 and 5.8 inches, transverse, 6.4, 4.8, and 5.4 inches, oblique, 6, 4.7, and 5.4 inches. In this pelvis the distance between the antero-superior iliac spines was 11.2 inches, the bis-iliac diameter was 12.8 inches, and the breadth of the symphysis, 2.4 inches. Sometimes the increase in size is confined to the upper portion (funnel-shaped pelvis), or the inferior half alone may be enlarged either on both sides or on one alone (as a result of fractures or dislocation). Such pelves give rise to certain disadvantages, viz.: The non-gravid uterus is more liable to become displaced. During pregnancy the organ remains longer within the true pelvis, and may thus cause disturbances of the bladder and rectum; it is prone to become retroverted, and towards the end of pregnancy, the head may descend so low as to affect the other viscera. The labor may be precipitate, and we may have in consequence rupture of the perineum and *post-partum* hemorrhage. After delivery there is a tendency to displacement of the uterus, especially to prolapsus, most common in women who leave their beds too soon.

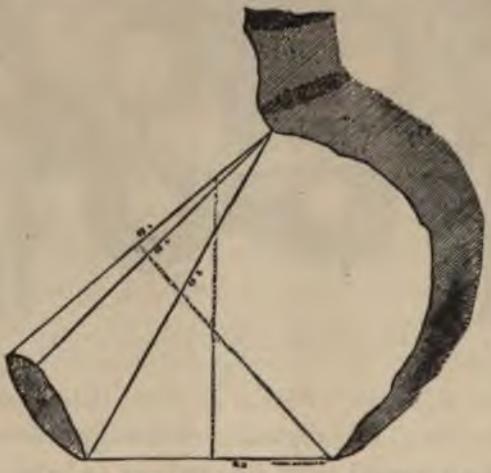

FIG. 3.—LARGE PELVIS (DIAGRAMMATIC.) (*Pinard.*)

Contracted Pelves.

Frequency.—Narrowing of the pelvis is most common in countries in which diseases that affect the shape and development of the pelvis are most frequent, especially in Flanders. Michaelis found narrowing in 72 women out of every 1000, Litzmann in 145, Schwartz in 140. Schroeder believes that the flattened, non-rachitic pelvis is quite frequent in Germany, being found more often than any other variety of deformity. Narrowing of the superior strait is much more common, then comes contraction of the inferior strait, and, finally, of the cavity, the two latter being nearly always associated. A pelvis may be diminished in all its proportions, or it may be unequally contracted—that is to say, the normal relation between its diameters may be altered.

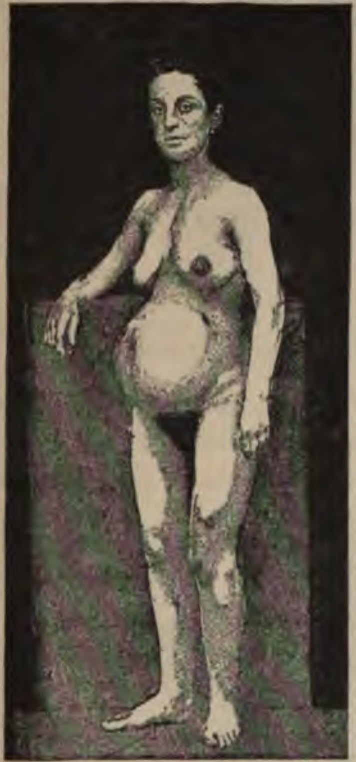
FIG. 4.—WOMAN WITH JUSTO-MINOR PELVIS.

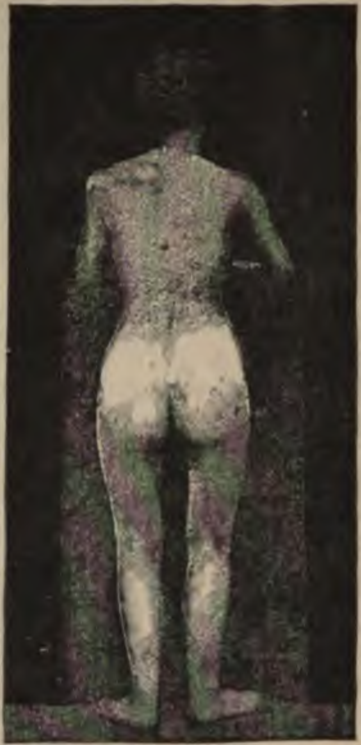
FIG. 5.—THE SAME; POSTERIOR ASPECT.

1. *Generally and Regularly contracted Pelvis.*—This pelvis (justo-minor) is characterized by shortening of its diameters, which, at the same time maintain their proper proportion to one another. There are two varieties. In the more common the pelvis differs only in size from the normal. (Figs. 4, 5). Its presence is not suspected before a vaginal examina-

tion is made during labor. The second variety is very rare, being only met with in dwarfs; the bones present the infantile type, being imperfectly ossified, the sacral segments and the three portions of the os innominatum are separated by cartilage. The relations of the diameters to one another, however, and to the pubic arch are the same as in a perfectly developed female. Figs. 10 and 11 represent a woman the antero-posterior diameter of whose pelvis measured 2.2 inches. She was delivered with forceps of a living seventh months' child.

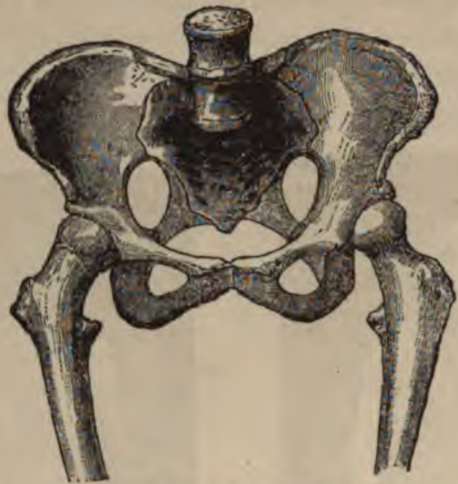

FIG. 6.—ABSOLUTE CONTRACTION WITH NORMAL SHAPE. (*Depaul.*)

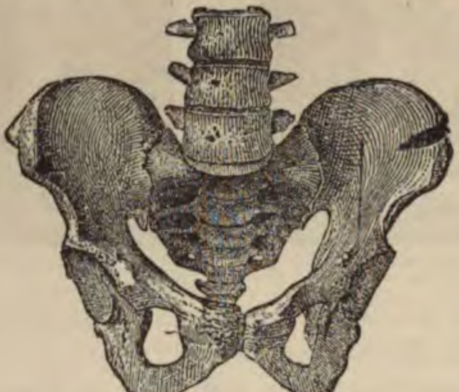

FIG. 7.—GENERALLY AND REGULARLY CONTRACTED PELVIS. (*Spiegelberg.*)

Naegelé has described a third form in which both the bones and the pelvic diameters present an infantile character; the condition being due to arrested development of the genital organs, which arrest may involve the entire skeleton, and even the intellectual faculties. It possesses no interest obstetrically. Only thirteen instances have been recorded.

Depaul says: "We must not take in too strict a sense the expressions 'uniformly contracted,' and 'regularly narrowed,' employed by writers to describe this variety of deformity. I have several pelves in which the diameters are all shortened, and the entire pelvis is quite regular. But, while the transverse diameter of the brim is shortened by only three-fifths of an inch, the shortening of the antero-posterior reaches one and three-fifth inches, so that the pelvis as a whole is evidently flattened from before backward, and may strictly, by reason of its regular shape, be included among the rachitic pelves." Those obstetricians who have affirmed that

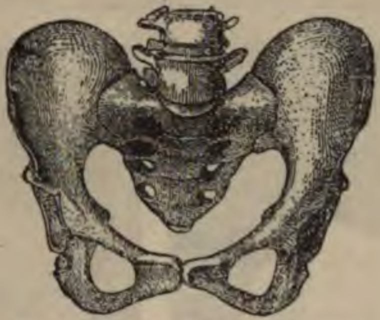

FIG. 8.—DWARF'S PELVIS. (*Spiegelberg.*)

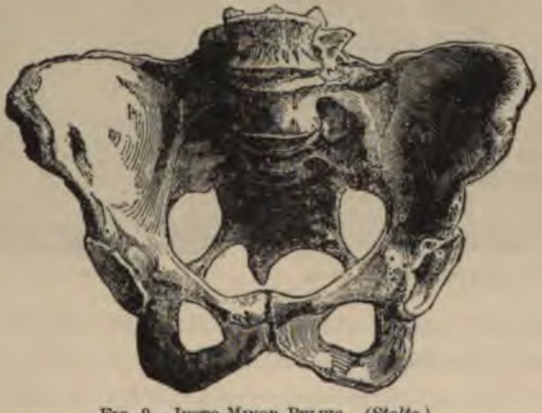

FIG. 9.—JUSTO-MINOR PELVIS. (*Stoltz.*)

such pelves resemble the male type are incorrect; they differ from the latter in the slight projection of thin, bony prominences, the slenderness of the bones, the divergence of the pelvic arch, the size and depth of the iliac fossæ, and finally, by the relatively increased capacity of the true and false pelves.

The cause of this deformity is still uncertain. Depaul regards it as "a freak of nature, the cause of which is as difficult to understand as is every other defect in proportion in the skeleton."

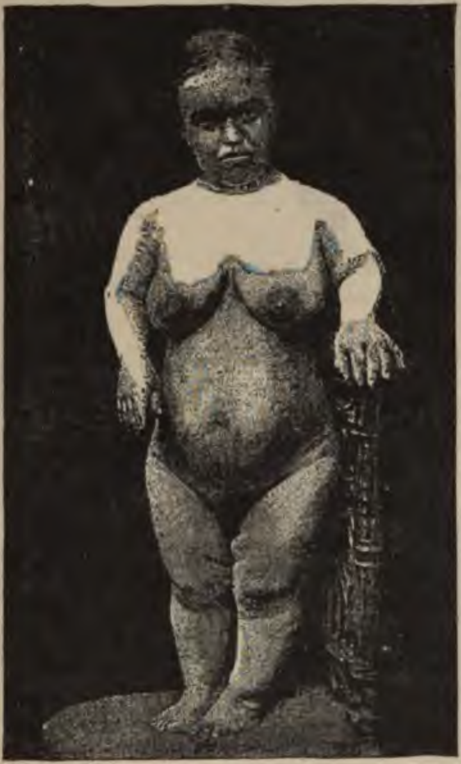

FIG. 10.—WOMAN WITH PHOCOMELACIA.

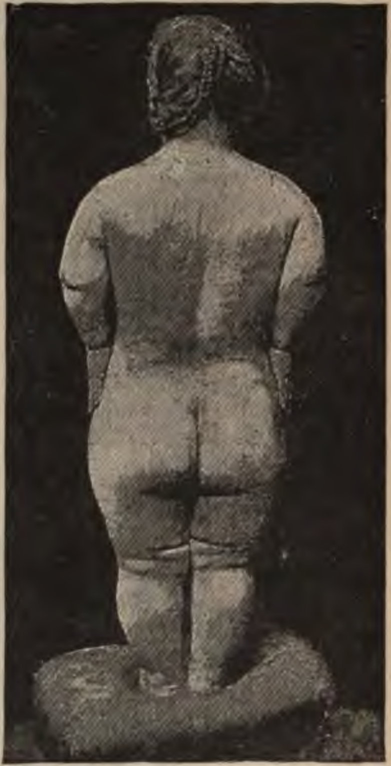

FIG. 11.—POSTERIOR ASPECT OF SAME.

Diagnosis.—This can be positively made only by the vaginal touch.

Prognosis.—It is very grave, since in thirteen cases observed by Lubac, ten women died and only three infants survived. It is so much the more serious, as there is nothing in the woman's stature to point to contraction, and the deformity is only recognized during labor, in consequence of the obstacles that prevent its progress. The prognosis varies according to the time at which we are summoned to interfere. In our two cases, both patients survived, one being delivered spontaneously at the seventh month, while in the other artificial labor was induced at the eighth.

II. *Irregularly contracted Pelvis*

In this, which is the most common form, the contraction may exist in one or all parts of the pelvis. Although the variations are numerous, three fundamental types exist, viz.:

1. Shortening of the antero-posterior diameter, resulting in flattening from before backward.

2. Shortening of the oblique diameters, causing sinking in of the antero-lateral walls.

3. Shortening of the transverse diameter, producing flattening or compression of the sides.

If the contraction is situated at the superior strait, it causes approximation of the anterior and posterior walls, while the rest of the cavity may be of normal size, or even enlarged; or the inferior strait may be involved, or both together, so that pelves of various shapes may exist (cordate, reniform, etc.). The deformity may be confined to the sacrum or symphysis.

a. *The Sacrum.*—The sacral curve may be exaggerated, the base of the bone projecting so far forwards as to increase considerably the prominence of the sacro-vertebral angle; sometimes the sacrum is entirely flat, or its concavity is replaced by a convexity, the line of junction between the first and second vertebræ being so marked as to resemble a second promontory, the entire sacrum appearing to be moved forwards. Or, on the other hand, the sacral curve is exaggerated to such a degree that the bone seems to be bent upon itself; as a result we have increased projection of the promontory and base of the sacrum, narrowing of the superior and inferior straits, and enlargement of the cavity. Sometimes the sacrum appears to rock upon itself in such a manner that the base approaches the symphysis, while the lower extremity recedes, causing narrowing of the superior strait, with enlargement of the lower portion of the cavity and the outlet.

b. *Symphysis Pubis.*—Instead of being convex, it may be flattened, or even convex posteriorly, forming the "figure-of-8" pelvis. The entire pelvis is then contracted (flattened pelvis); or the symphysis may be broader than normal, being more inclined from before backwards, or from behind forwards.

c. *Coccyx.*—Anchylosis of the coccyx may cause variations in the antero-posterior diameter of the outlet.

There is another change which affects the superior strait, due to spondylolisthesis. The promontory is then formed, not by the sacrum, but by one of the lumbar vertebræ, and the brim is thus contracted, sometimes to an extreme degree. In some instances the symphysis is flattened by reason of the compression of the horizontal rami of the pubes, so that the latter become parallel and juxta-posed. The symphysis assumes the shape of a duck's bill, and, since the gutter formed by the approximation of the pubic rami is useless during labor, there results very marked shortening of the antero-posterior diameter of the pelvis, both at the brim, and in the cavity. (See Osteomalacia.) When the shortening of the oblique diameters is produced by compression of the antero-lateral walls, it may exist on one or both sides; this is due to flattening of the femur, and even projection of this bone into the pelvis, at a point corresponding to the bottom of the cotyloid cavity. As a result, the normal curve of the superior strait and cavity disappears, the hip-bone becomes flattened and straightened, the pelvic curve convex, and, when both sides are compressed, there is shortening of all the diameters of the brim and outlet, so that the pelvis assumes a trefoil shape. This compression is often confined to one side, at least the deformity is more marked on one than on the other (oval, or obliquely-oval pelvis). Rarely the transverse diameters are shortened, from atrophy or non-development of the ilium, or because the latter is pressed towards the median line. The shortening is usually confined to the transverse diameters of the cavity and outlet (funnel-shaped pelvis). All these varieties may be combined, giving rise to complex forms; such pelves may, however, be classified according to the causes that have produced these deformities. But, in addition to those special causes, which we shall study a little later, there are three factors which affect the entire pathology of the pelvis, and these deserve some attention. As Schroeder says, in order to account for the deformities of the pelvis, we must go back to the new-born infant and study the agents that transform its pelvis into the adult form, because these will subsequently produce the various malformations, whenever there exists softening, or pathological changes in the pelvis. These causes are the pressure of the trunk, the mutual traction exerted upon each other by the iliac bones at the level of the symphysis pubis, and the counter-pressure of the femora. The weight of the trunk tends to force the sacrum downwards into the pelvis, but since the centre of gravity of the trunk falls in front of the sacro-iliac articulation, the sacrum rotates about its axis, so that the promontory tends to sink into the pelvis, and the tip of the sacrum to point directly backwards. But the extremity is firmly fixed by its ligaments, so that the sacrum is curved from above downward. On the other hand, while the sacrum has a tendency to sink into the pelvis, it produces, through the medium of the sacro-iliac ligaments, considerable traction upon the posterior superior iliac spines. As the latter, accordingly, approached each other behind, their pubic ends would be drawn apart in proportion to the amount of traction exerted posteriorly; hence there occurs an antagonism of forces, which results in the curving of the bones at the point of least resistance, that is to say, at the level of the articulation. This curve is a regular one according as the upward pressure of the femora upon the bottoms of the cotyloid cavities is added to the traction, in an opposite direction, made upon the anterior and posterior extremities of the iliac bones. If these three forces act regularly, simultaneously, and in proper proportion, we shall have a normal pelvis; if one or the other force predominates, the result will be a deformity which corresponds to the character and intensity of that force.

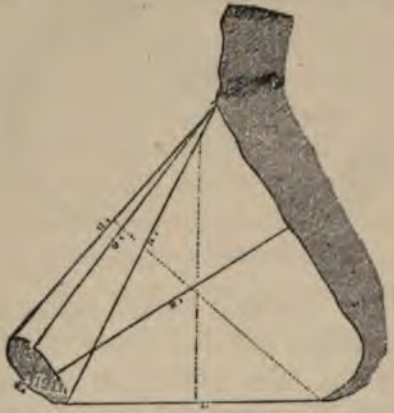

FIG. 12.—HIGH PELVIS. (*Pinard.*)

Besides these principal types of pelvic deformity, some others should be mentioned, which, as Depaul says, are only of importance so far as they are associated with the anomalies before-mentioned; these are abnormalities in the height, weight, or structure of the pelvis. Lenoir has described a pelvis that was too high, and another that was too low, but Depaul believes that he was in error when he endeavored to represent these as special types. This deformity in itself could hardly impede to any serious extent the progress of labor, and, if the diameters are normal, it is of no consequence. The same remark applies to variations in the thickness, resistance, weight, and structure of the ilia and sacrum; it is only when associated with other pathological conditions that they may under certain circumstances increase indirectly the complications already existing. There may be six instead of five sacral vertebræ, and the symphysis may be 2 or 2½ inches broad, or the coccyx may be anchylosed, all of which conditions may help to retard labor.

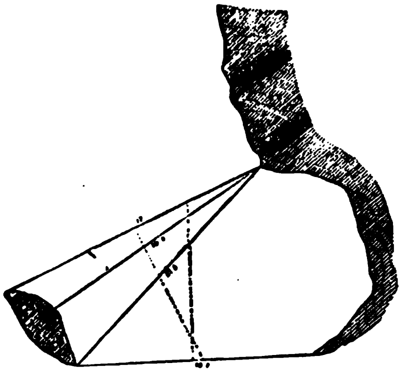

FIG. 13.—LOW PELVIS. (*Pinard.*)

III. *Faulty Inclination of the Pelvis.*

The inclination of the pelvis may be increased or diminished, more often increased. Now, as Naegelé and Grenser show, the head may be arrested at the level of the symphysis, and thus it may be slow in engaging. If in this case the other conditions of parturition are normal, this slight difficulty is soon surmounted. But if, as usually happens, there exists at the same time a greater or less disproportion between the head and the pelvis, the resistance offered by the anterior wall of the pelvis exerts a more unfavorable influence. In these cases Schultze and Naegelé and

Grenser advise that, whenever the head of the fœtus impinges against the symphysis, at the brim of the pelvis, the woman should recline in such a way that the lumbar portion of her vertebral column is strongly flexed, —that is to say, that she should assume a semi-recumbent position. This bent attitude assists the entrance of the head into the true pelvis.

The pelvis may be abnormally inclined forwards, backwards, or laterally. Forward inclination (anterior obliquity) consists in a more or less marked exaggeration of the normal inclination of the inferior strait, and is most common in rickets. In a case described by Naegelé, the inferior strait was directed straight backwards, the symphysis pubis and the upper half of the sacrum were horizontal, and the right ramus of the pubic arch was less inclined than the left, so that intercourse could only take place in a posture the reverse of the usual one. This did not cause contraction and the woman had seven children. Posterior obliquity is never as marked as anterior. In the most extreme degree of this deformity, the plane of the superior strait is horizontal, so that the axis of this plane is vertical and coincides with the axis of the body. Posterior obliquity may exist alone or be associated with other malformations. The vulva is often directed farther forward than normal, and the symphysis is more nearly vertical. The upper half of the sacrum is parallel with the axis of the body, and the lumbar curve is almost or quite absent. Finally, the tip of the coccyx in the erect posture is always either at a level with, or below the summit of the pubic arch, and the twelfth rib is generally nearer to the crest of the ilium than normally. In lateral inclination the pelvis is more or less inclined to the right or left. This inclination is mostly observed in rachitic pelves, and in patients with shortening, or atrophy of one of the lower limbs, or dislocation of the hip. The most striking peculiarity is the difference in level of corresponding parts of the pelvis. This abnormality is more frequently associated with other more important deformities than are the two preceding forms.

FORMS AND TYPES OF DEFORMED PELVES.

Although practically pelvic deformities may be divided into three classes, as viewed from an anatomical standpoint, there are several different varieties. Schroeder describes among the common forms:

1. The generally and uniformly narrow pelvis.

2. The flattened pelvis, including the non-rachitic flattened, and the generally and irregularly contracted.

3. The flattened rachitic, including the simple flattened, the uniformly and generally contracted, the pseudo-osteomalacic, the scoliotic, the kyphotic, and the kypho-scoliotic.

4. The pelvis flattened by reason of double dislocation of the hip.

5. The pelvis with congenital fissure of the symphysis.

Among the rare forms he includes the following: The spondylolisthetic, kyphotic, funnel-shaped, obliquely-contracted, transversely contracted, osteomalacic, and the pelvis obstructed by foreign growths, etc.

Spiegelberg recognizes only three varieties, viz.: The simple flattened pelvis, rachitic or non-rachitic, the uniformly narrow, and the uniformly contracted and flattened.

Depaul distinguishes five prevailing conditions, rachitis, osteomalacia, abnormal development, deformities of other parts of the skeleton connected with the pelvis, and fractures, dislocations, exostoses, etc.

Pinard also recognizes five principal types, as follows: 1. The rachitic pelvis, in which there is an exaggeration of the sacral curve, with descent of the promontory (pseudo-osteomalacic). 2. The rachitic pelvis, in which the promontory descends, while the sacrum is straight or even concave. 3. The rachitic pelvis, in which the relative lengths of the diameters is unchanged. 4. The pelvis in which the deformity is due to both rickets and some other pathological condition, as spinal disease. 5. The rachitic pelvis, in which there is extreme lateral deviation of the promontory. He also describes other sub-varieties.

The Flattened Pelvis.

We have seen that the most common deformity consists in antero-posterior flattening, causing shortening of the conjugate diameters. Although this has until recently always been attributed to rachitis, Schroeder, Spiegelberg, and others, have observed it in women who presented no evidences of that disease. At first sight such a pelvis appears to be normal, but, on measuring it, we find that the antero-posterior diameter of the brim is shortened, so that the pelvis is flattened from before backwards. The other diameters are nearly normal, except the transverse, which is slightly increased, because of the outward curve of the ilia.

The contraction is accordingly confined to the superior strait and cavity, but, as the sacrum does not revolve on its transverse axis, its anterior inclination is very slight, so that the contraction is usually slightly marked (never below 3.2 inches), and does not cause any serious difficulty during labor. In some cases, however, the sacrum is inclined forwards to a greater degree, so that there appears to be a second promontory, which may be mistaken for the true one. The causes of this deformity are little known; they are due, perhaps, to carrying heavy burdens before puberty, as well as to retarded development.

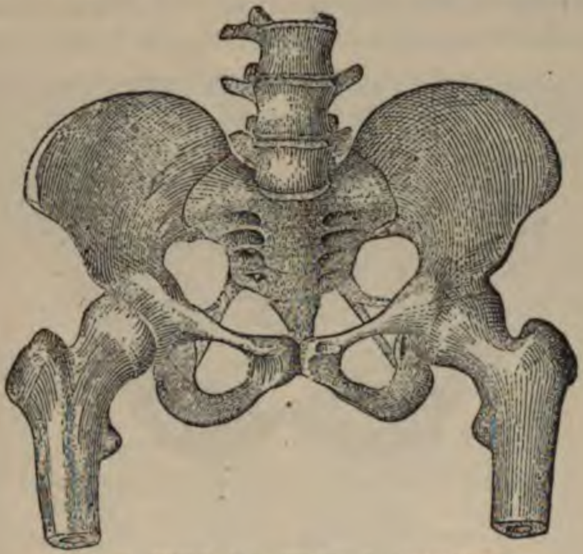

FIG. 14.—SIMPLY FLATTENED PELVIS. (*Spiegelberg.*)

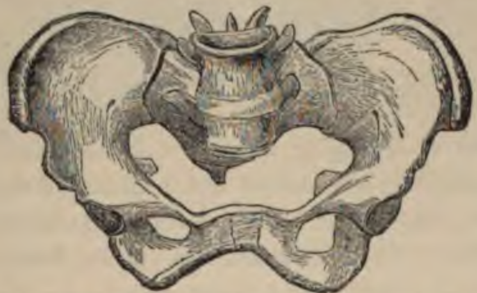

FIG. 15.—PELVIS CONTRACTED FROM BEFORE BACKWARD. (*Pinard*)

As the women present no characteristic external appearance, the diagnosis of this condition can only be established by measuring the pelvis. The distances between the iliac crests and spines are but little changed, but the external conjugate is always shortened.

Schroeder has described a form of pelvis, to which he has given the name, "uniformly flattened and contracted pelvis." (Fig. 16.) It differs from the generally and regularly contracted type, only in the disproportion that exists between the conjugate and the other diameters. This sub-variety of the Germans seems to be more theoretical than practical, since flattened pelves are really rachitic pelves in which the rachitic element is but slightly marked. When the rachitis becomes more marked, we have the flattened rachitic pelvis of German writers.

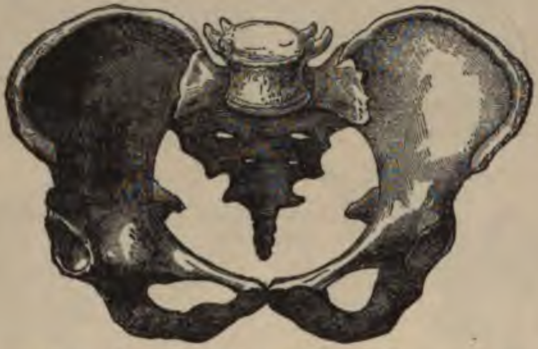

FIG. 16.—GENERALLY AND IRREGULARLY CONTRACTED NON-RACHITIC PELVIS. (*Schroeder.*)

The Rachitic Pelvis.

Rachitis is a disease that attacks infants, usually at the age of from eighteen to twenty months—that is to say, at a time of life at which the osseous structure is developing rapidly; it is characterized by arrest of development, softening, and fragility and flexibility of the affected bones. The bones never regain their normal development after the disease has ceased to be active. The deformities occur from below upwards (tibia, femur, pelvis, etc.), especially in children who become rachitic after they have begun to walk.

Rickets is not sufficient in itself to produce deformities; by softening the bones and rendering them more flexible, it renders them liable to become deformed, but this malformation is only due to the influence of external causes. Beside the three factors mentioned by Schroeder, the weight of the trunk, the traction of the ilia at the level of the symphysis, and the counter-pressure exercised from below upwards by the femora, we must, with Kehrer, consider muscular traction, and, with Depaul, accidental weights, independent of the body.

Let us study the effects produced upon the pelvis by these different agencies. If the child remains absolutely in the dorsal position, the influence of the first three factors will be *nil*, hence the form of the pelvis will not be changed. (Schroeder's "Liegbecken," the pelvis of the reclining posture.) The weight of the body is the only one of these forces that can act alone, and it can only act in cases of congenital fissure of the symphysis. Although the three forces are more or less concomitant, one may predominate, and thus cause characteristic deformities. If the child does not walk, the counter-pressure of the femora is absent, and the weight of the body and the traction at the symphysis result in antero-posterior flattening, with lengthening of the transverse diameter. (Schroeder's "pelvis of the sitting posture.") If the three forces act to-

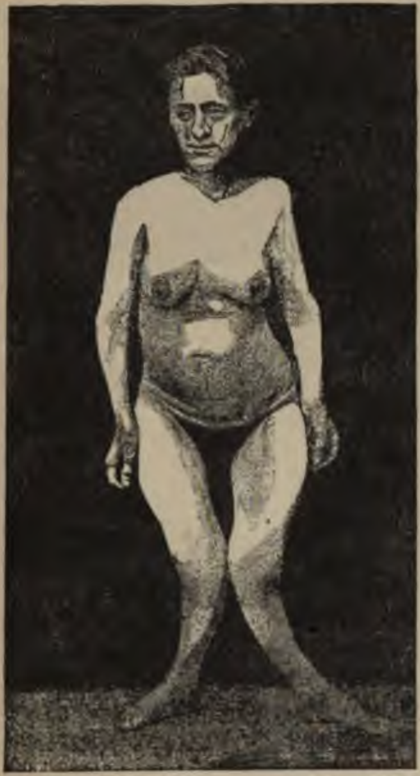

FIG. 17.—RACHITIC WOMAN.

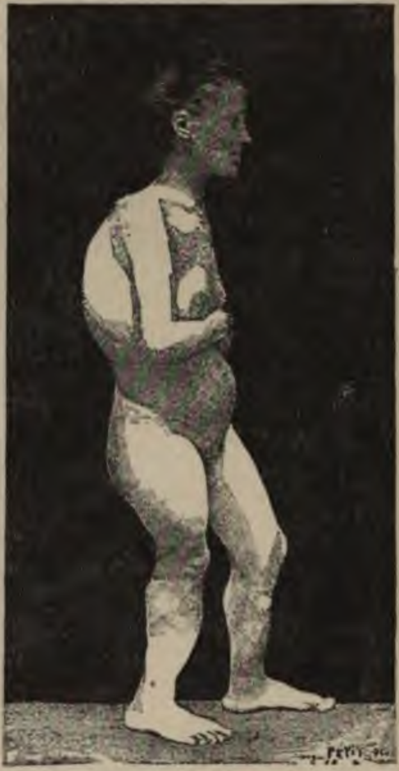

FIG. 18.—RACHITIC WOMAN.

gether upon a pelvis the bones of which are all softened, there results the osteomalacic form.

But, aside from these agencies, there is another that is quite as important, the external pressure to which the pelvis is subjected, even in the dorsal recumbent posture, and still more when the child is carried on the arm. Being compressed between the trunk on one side and the femora on the other (acting on its antero-lateral wall), the pelvis becomes flattened and deformed by the projection of the sacrum anteriorly, and by the flattening of the symphysis and the horizontal rami of the pubes. Hence there results shortening of the conjugate diameter of the brim; the oblique diameters are but slightly changed, since the traction which is exerted posteriorly upon the iliac bones, is transmitted to the symphysis, and partly opposes the action of the femora. The cavity and the outlet are usually but slightly affected, indeed their dimensions may be increased, but if the sacrum is curved inwards strongly, the depth of the

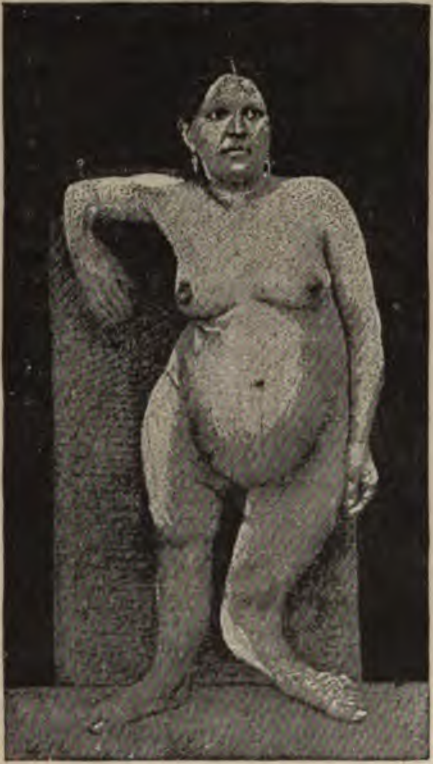

FIG. 19.—RACHITIC WOMAN. (Anterior Aspect.)

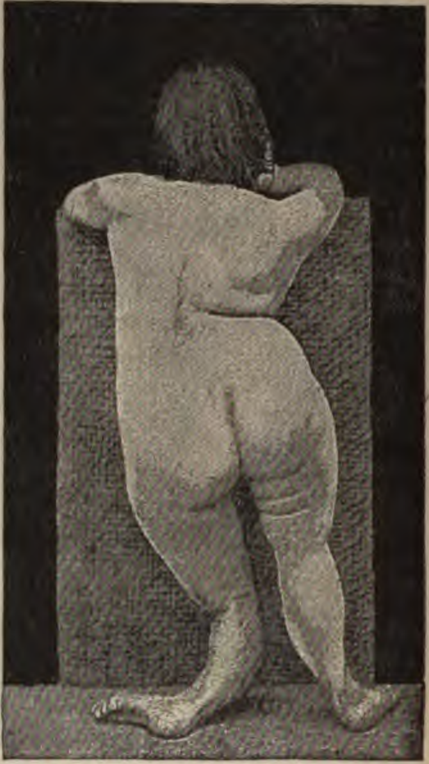

FIG. 20.—THE SAME. (Posterior Aspect.)

pelvis is diminished. As these forces are not equal, regular, or directed toward the same point, the pelvis may present various irregularities in its shape. The sacrum may have a lateral, as well as an anterior, deviation, or the pelvis may be more deformed on one side than on the other; finally, the change may affect the outlet, and sometimes deviation of the ischia, or the end of the sacrum and coccyx, may cause contraction of the inferior strait, either transversely or antero-posteriorly.

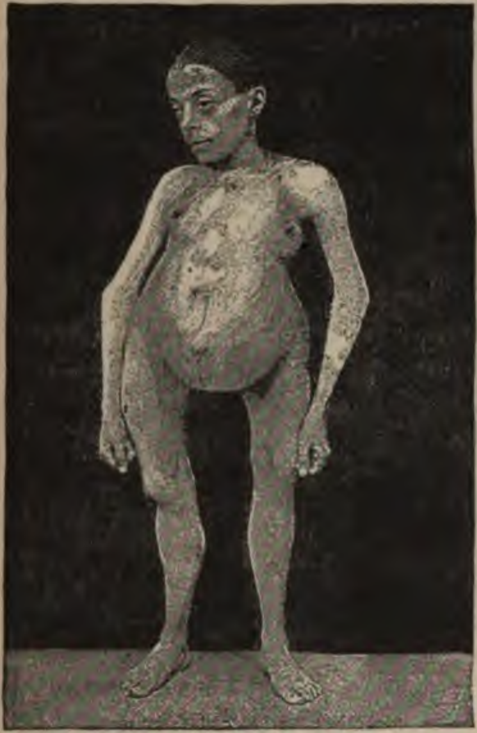

Fig. 21.—Rachitic Woman. (Anterior Aspect.)

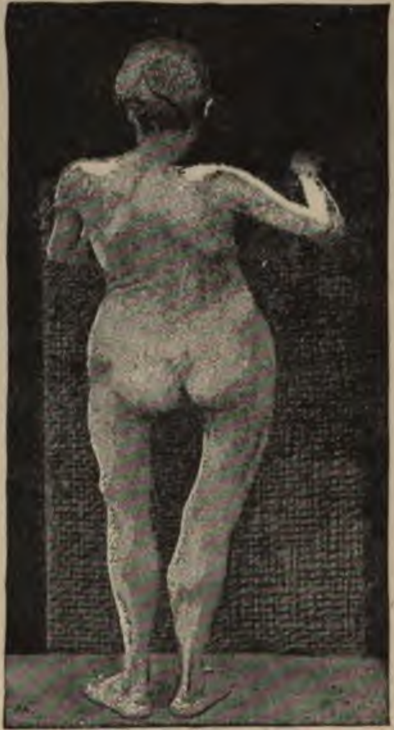

Fig. 22.—The Same. (Posterior Aspect.)

Aside from weight, we must also take into account traction, whether exercised by muscular or by fibrous tissue; the latter may cause deformity of the iliac crests, the ischio-pubic rami, and various apophyses and tuberosities, to which muscles are attached.

Finally, we must not forget that rickets is associated with arrest of development, that causes that smallness and slenderness of the bones so commonly found in rachitic pelves. It is the exception to find the bones thick and massive. Rachitic females are usually of small stature, with short, slender limbs; there is often curvature of the spine, in consequence of which they have a peculiar oscillating gait. The hips are large, the buttocks prominent; the lower limbs present more or less marked curvatures, while the arms are short, slender, and occasionally curved inwards, the hands being small and short. The thorax presents projections at the chondro-sternal articulations (rachitic rosary), while the head is large, the forehead prominent, and the lower jaw projects forward. Pajot has called attention to the asymmetry of the face, and the inequality of the eyes.

Figs. 27 to 22 represent rachitic women, observed by my colleague, Bailly.

The woman in Fig. 17 had a pelvis measuring 2.7 inches in the conjugate, after deduction. One premature labor at eight months, one labor at term, delivery by forceps. Living child.

In Fig. 18, the pelvis measured 3 inches. Two pregnancies. Issue the same as above.

Figs. 19 and 20, a multipara, conjugate of 3.5 inches. Five labors at term, one at term with prolapse of cord. Five living children.

Figs. 21 and 22, pelvis of 2 inches. Cæsarean section at term. Living child, mother died on fourth day.

The pelvis presents the following characteristics: 1. The bones as a whole, are abnormally small, the sacrum is short and straight. The iliac bones are so thin as to be almost transparent in some places.

2. The sacrum is depressed and rotated on its transverse axis. Its concavity may disappear, the bone being straight or even convex. The posterior iliac spines project prominently over the posterior aspect of the sacrum, the bodies of the vertebræ (especially that of the first) are much compressed posteriorly.

3. The distance between the crests of the ilia is less than that between the anterior superior spines.

4. The pubic arch is increased, the ischial tuberosities are more widely separated than normal, and the cotyloid cavities are directed more anteriorly, the pubic symphysis is flattened (or is even convex posteriorly) and thus tends to approach the promontory.

5. Since the pelvis is flattened in this manner, the conjugate diameter of the brim is always shortened, and this shortening is generally in proportion to the degree of malformation of the pelvis.

6. The oblique diameters of the superior strait are also diminished in length, but this shortening is not constant.

7. The transverse diameter may be of normal length, or even longer.

8. The sacro-cotyloid measurements are considerably diminished.

9. According to Schroeder, all the diameters in the cavity are lengthened; but Depaul states that the right oblique diameter is always shorter than normal.

10. The diameters at the outlet are usually normal, or the transverse and conjugate may be slightly increased.

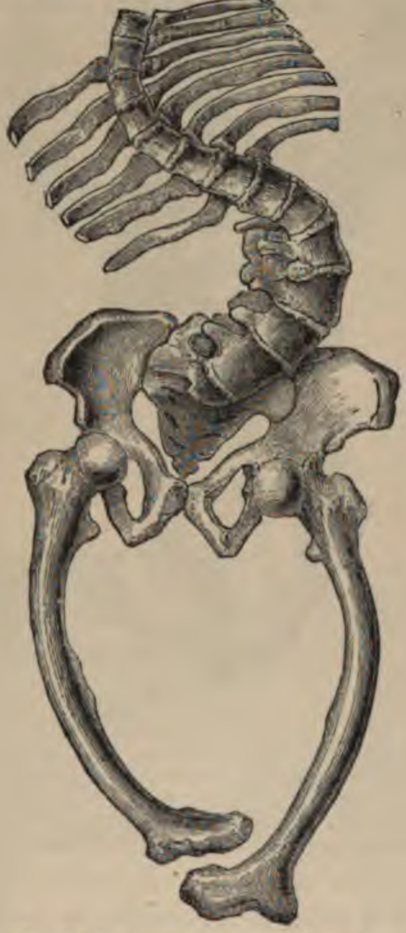

FIG. 23.—RACHITIC DEFORMITY. *(Depaul.)*

11. The entire depth of the pelvis is diminished, as well as that of the sacrum and symphysis pubis.

12. The anterior inclination of the pelvis is lessened in proportion to the depression of the sacrum.

13. The average weight of the pelvis is notably diminished (10 to 16 ounces, the normal being 24 ounces.)

14. Around the edge of the superior strait, especially in its anterior half, are sharp projections and spines, which may cause serious lesions of the soft parts, in consequence of prolonged pressure, during labor. The pubic crest and ilio-pectineal eminence may be the seat of these sharp knife-edged projections, which may be either unilateral or bilateral. In the living subject these edges are, of course, covered by the soft parts, the spine of the pubes, in particular, being enclosed in such a thick covering that it rarely does any harm. In certain cases, however, when the pelvis is contracted and labor is prolonged, if the head is compressed for a long time at the superior strait, a lesion may be produced in that part of the uterus which is caught between this sharp projection and the head, or between the promontory and the head, and the organ may even be perforated.

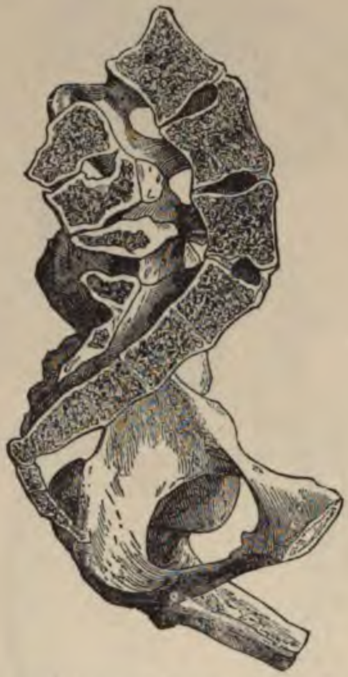

FIG. 24.—RACHITIC PELVIS, WITH ANTERIOR CONVEXITY OF THE SACRUM,; ANTERO-POSTERIOR CONTRACTION CALLING FOR THE CESAREAN SECTION. (*Stoltz.*)

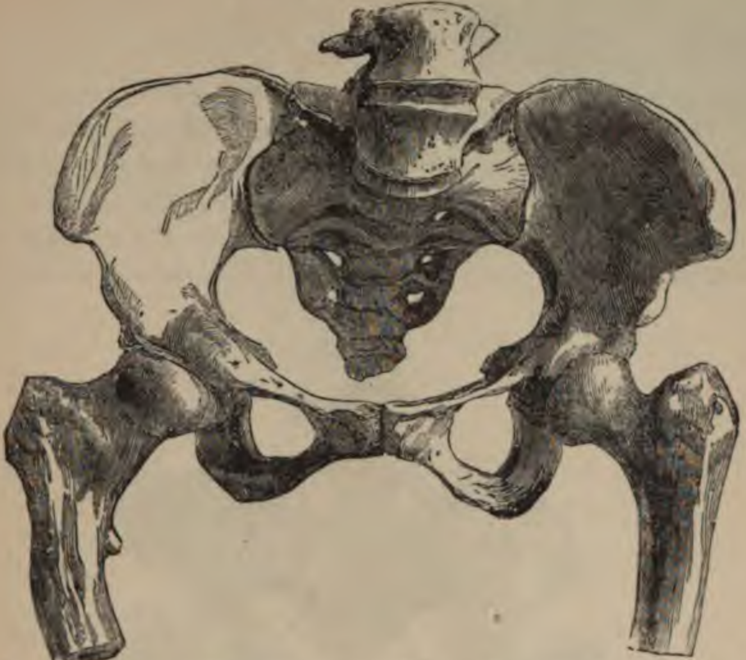

FIG. 25.—RACHITIC PELVIS. PERFORATION IN TWO LABORS. PREMATURE LABOR INDUCED IN THE THIRD. CHILD LIVING. MOTHER DIED. (*Stoltz.*)

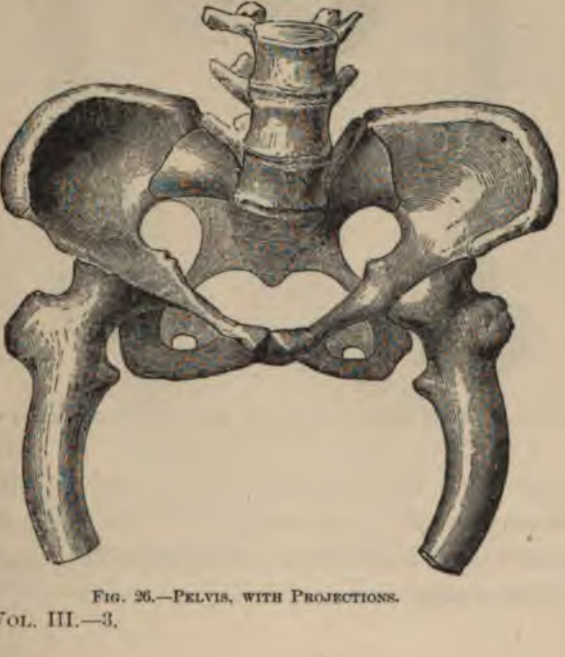

FIG. 26.—PELVIS, WITH PROJECTIONS.

The Pseudo-osteomalacic-rachitic Pelvis.

In this variety the promontory is deeply depressed by reason of the tilting of the sacrum, the bone presents an exaggerated curve, which causes its two extremities to approach each other, the cotyloid cavities are approximated, and the symphysis projects forwards. The superior strait has a triangular shape, the ilia curve inwards, and seem to be folded upon themselves. This deformity naturally results when infants are made to walk while their bones are still in a condition of rachitic softening. The sacrum is driven downwards into the pelvis by the weight of the trunk, while the acetabula are forced inwards by the counter-pressure exerted by the heads of the femora.

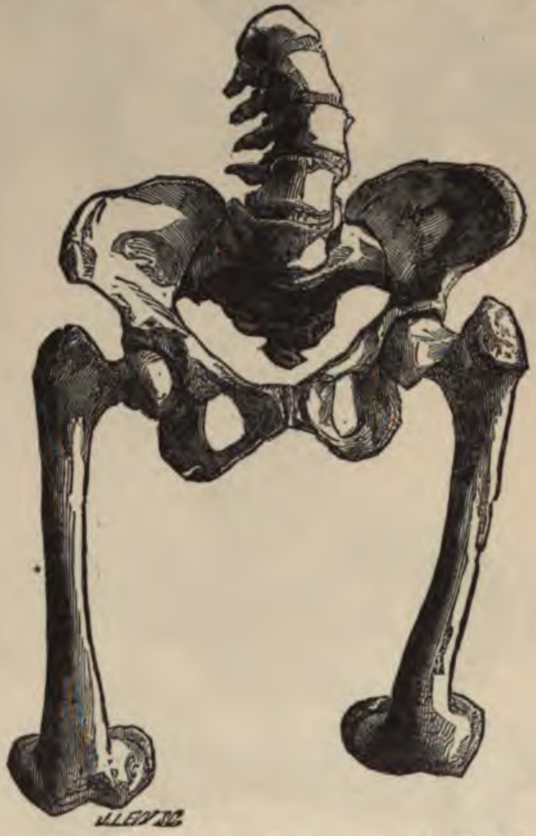

FIG. 27.—RACHITIC, PSEUDO-OSTEOMALACIC PELVIS, WHERE CESAREAN SECTION WAS REQUIRED. (*Stoltz.*)

An attempt has been made to include rachitic and osteomalacic pelves under a common head, the deformity in both cases being regarded as due to softening of the bones. But in rachitis the bones fail to harden, in osteomalacia they become softened after being hard; in the former case there is progressive metamorphosis, in the latter, retrograde degeneration.

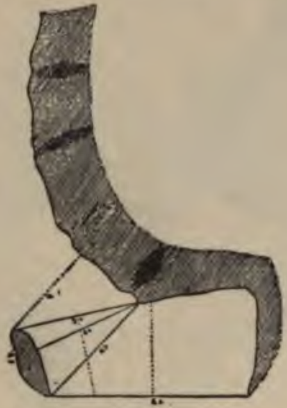

FIG. 28.—RACHITIC PELVIS, WITH EXAGGERATED SACRAL CURVATURE, AND LORDOSIS OF THE LAST LUMBAR VERTEBRÆ. (*Pinard.*)

Pinard affirms that in the lesser degrees of osteomalacia the shape of the pelvis is identical with that of the well-marked rachitic type. Spiegelberg describes two varieties of the pseudo-osteomalacic rachitic pelvis, in which the bones of an already rachitic pelvis undergo secondary softening, so that the same malformations are produced as in osteomalacia. A pelvis of this character is distinguished from a true osteomalacic pelvis, by the solidity of its bones, the smoothness of their surfaces, and by the fact

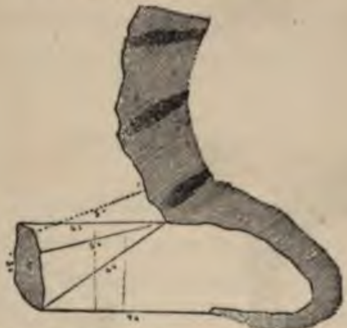

FIG. 29.—RACHITIC PELVIS, WITH EXAGGERATED CURVATURE. (*Pinard.*)

DIFFERENT CURVES IN RACHITIC PELVES.

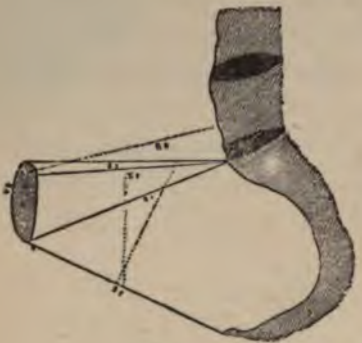

FIG. 30.

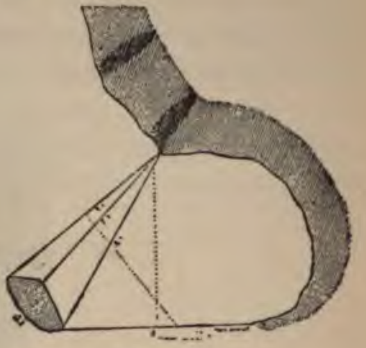

FIG. 31.

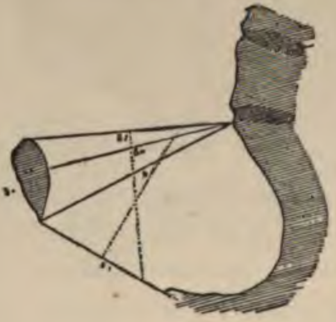

FIG. 32.

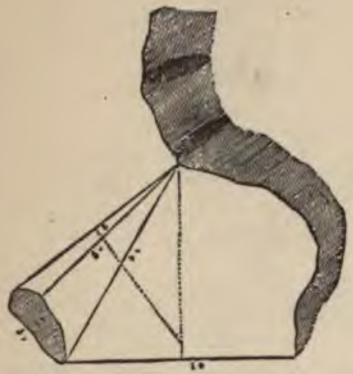

FIG. 33.

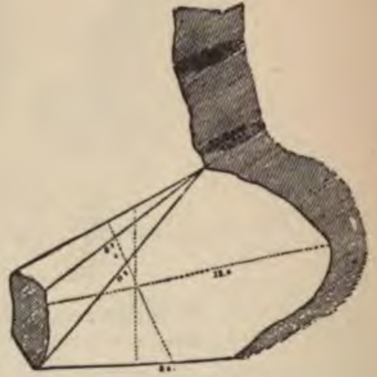

FIG. 34.

that their size is greater than normal; the distance between the anterior superior iliac spines is increased. The rest of the skeleton, moreover, presents the characteristic changes of rickets. "It is not very rare," says Depaul, "to find localized in a single bone changes that bear the mark of rickets. We can imagine how, in such cases, the pelvic deformity differs from that which results from simultaneous malformation of all the bony parts." As a rule, there is in this instance only an unequal distribution of the rachitic changes, of which we find traces in other bones. This is the case in the pelvis here represented. (Fig. 36.) On examining it carefully, we note in the rest of the skeleton evidences of the disease, which is unequally distributed, and, by reason of its predominance in a single bone, appears at first sight to have been localized in that bone.

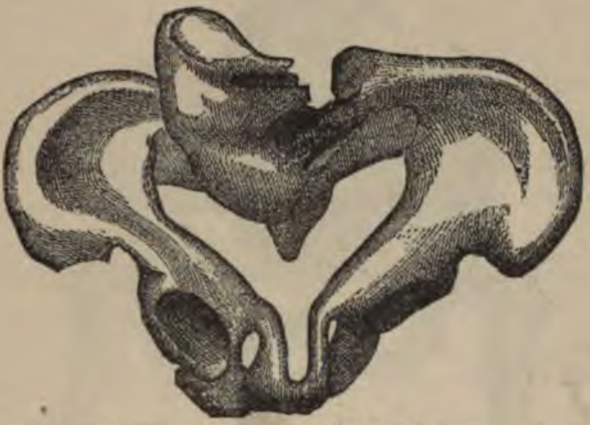

FIG. 35.—RACHITIC, OSTEOMALACIC PELVIS. FIVE NORMAL LABORS. (*Spiegelberg.*)

Osteomalacic Pelvis.

Osteomalacia is a disease of adult life. It rarely appears before twenty, generally developing between the ages of thirty and fifty; it is confined almost exclusively to poor women, who have been enfeebled by residence in damp, unhealthy dwellings, by insufficient nourishment, and repeated pregnancies. Osteomalacia does not attack women alone, but it is limited to adults. According to Ranvier, we must distinguish true osteomalacia in adults from the osteoporosis that occurs in old age. Kilian describes two varieties, *osteomalacia psathyra* (fracturosa), and *osteomalacia apsa-*

thyros (cohærens); these are really only successive stages of the same disease, so that both forms may be observed in the same subject. Sometimes the bones are yellowish, compressible, and rugose on the surface, sometimes they are quite porous, and brittle, the weight of the entire pelvis being greatly diminished. The most characteristic feature of this pelvis, however, is the fact that it presents apparently normal dimensions, the bones being of the usual size and thickness; in short, there are no evidences of arrest of development as in the rachitic pelvis.

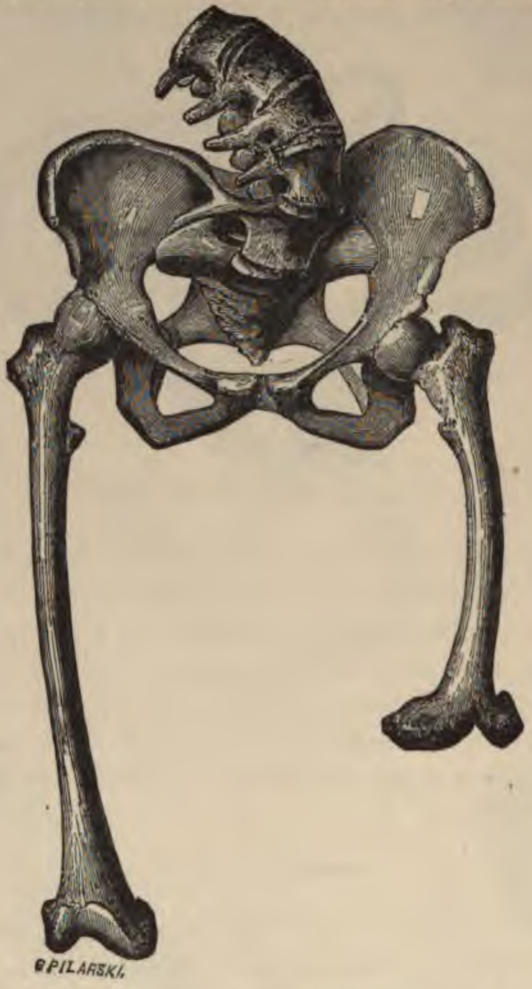

FIG. 36.—UNILATERAL RACHITIS.

Pathologically the disease is to be regarded as an osteomyelitis and progressive osteitis; the bone is deprived of its lime-salts, while at the same time all the other softened bone-tissues are compressed by the morbid proliferation of the marrow. When the women are in poor condition, the constant hyperæmia to which the bones are subject during the entire course of pregnancy, (especially when pregnancies follow one another in rapid succession), lead to the outbreak of the disease. Osteomyelitis is the initial process. The marrow is destroyed and is replaced by a young medullary substance of a reddish color, the small round cells of which proliferate under the influence of the excessive hyperæmia. The removal of the lime salts is effected through the agency of the Haversian canals, an osteoid tissue being formed, which in turn becomes dissolved, and is eventually replaced by the proliferated medullary tissue. This substitution of medullary for osteoid tissue is observed along the Haversian canals, so that in the midst of the marrow there are found islands of intact osseous lamellæ. Finally, the entire bone becomes soft, like wax, and cuts readily, though crackling in some spots. In extreme cases nothing is left but a membranous sac, formed by the periosteum, containing medullary substance and fat. No trace of glutin or chondrin remains in the bone, while the carbonate and phosphate of lime are greatly diminished in amount.

Pagenstecher affirms that the disease is ushered in with pains in the affected bones, localized in one or both of the tuberosities of the femur. The pain extends successively to the symphysis and ischial spine, then to the sacrum and lumbar region; the hips, shoulders are next affected, and, in order to avoid the pain caused by movements of the joints, the women remain as nearly immovable as possible. As sitting is very painful, the patients lie on one side. Remissions and exacerbations may continue for months and years, when bronchial and gastric catarrh supervene, and become chronic. The patients become feeble and emaciated, and in some instances, the stature is appreciably diminished. The specific gravity of the urine is below the normal, but there is no increase in the amount of salts. According to Gusserow, women suffering from osteomalacia have a sullen, morose physiognomy, caused by their sufferings, and characteristic of the disease.

The osseous deformities, and especially those of the pelvis, concern us most. The softened bones of the pelvis, being subjected to pressure from the weight of the body, and to the counter-pressure of the femora, as well as to pressure from external causes, become malformed, bend inwards, fold upon themselves, and give to the pelvis a characteristic form. The deformity is as follows: The ilia become curved upon themselves and present a groove (sometimes bifurcated), directed from above forwards and inwards. Driven inwards by the pressure of the thigh bones, the cotyloid cavities are carried upwards, forwards, and inwards, approaching at the same time each other, and the promontory. The horizontal rami of the pubes become nearly parallel, leaving between them a mere cleft, narrow above, a little larger below, the symphysis having the shape of a duck's bill. The pubic arch disappears, and is replaced by a sort of deep, narrow fissure, through which the index finger can barely pass.

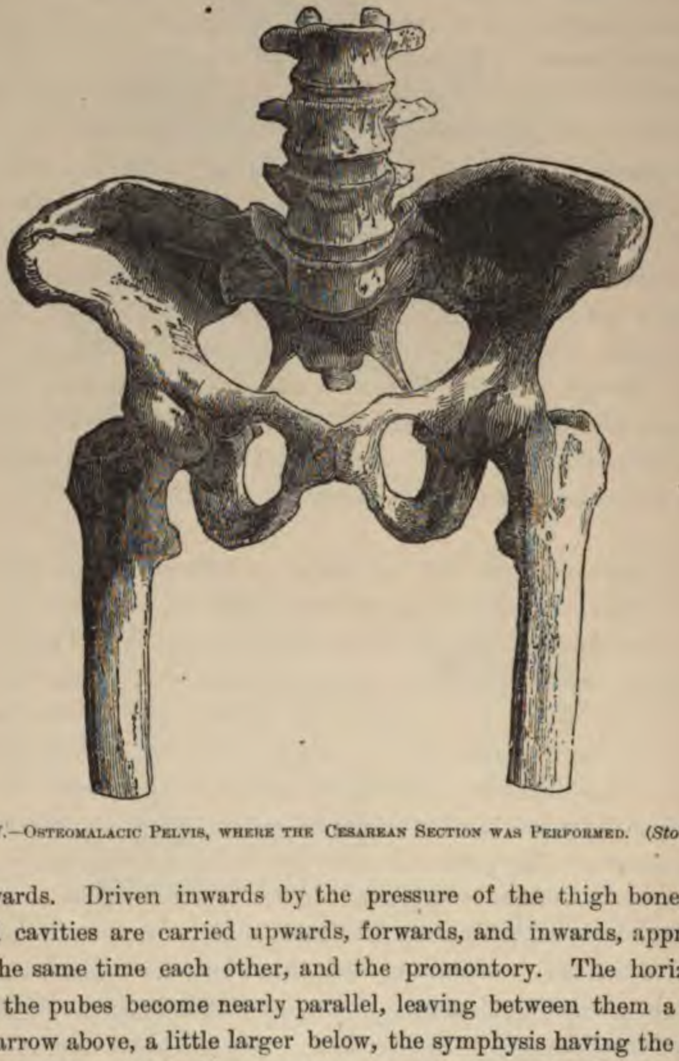

FIG. 37.—OSTEOMALACIC PELVIS, WHERE THE CESAREAN SECTION WAS PERFORMED. (*Stoltz.*)

The ischial tuberosities are driven inwards to an extreme degree, and thus narrow the inferior strait and cavity, while the posterior superior iliac spines are bent inwards, and are so small that they project but slightly behind the sacrum, and lie in the same plane as the spine of the last lumbar vertebra. The sacrum describes an excessive curve in such a way that its middle portion projects posteriorly, while its upper end sinks deeply into the pelvis, and the lower end shows a marked tendency to approach the upper. In place of the regular concavity, there is a sort of angular groove, surmounted at its upper extremity by the projecting promontory. By reason of the lowering of the latter, the lumbar vertebræ form at the upper part of the pelvis a projection above the superior strait, that also serves to narrow it. The pelvis assumes a peculiar ap-

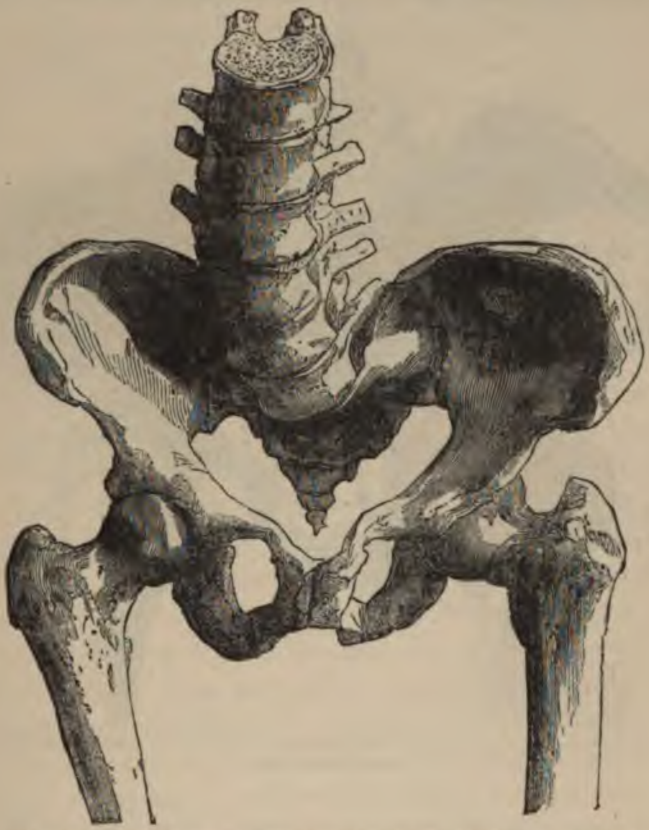

FIG. 38.—A SIMILAR PELVIS, CALLING FOR THE SAME OPERATION. (*Stoltz.*)

pearance that has caused it to be compared to a trefoil. All the angles are well-marked, and it is deformed and altered in all its parts. The superior and inferior straits and cavity are all affected by the deformity, and often to such an extent that the diameters are reduced to a surprising degree. The conjugate at the brim may preserve entirely its normal length, while the transverse is so much shortened that there really remains no opening to be utilized for delivery. The distance between the anterior superior iliac spines is diminished, the breadth of the symphysis is increased, and the concavity of the sacrum is represented by a transverse groove. The pubic rami are nearly in contact, so that the arch becomes merely a deep fissure.

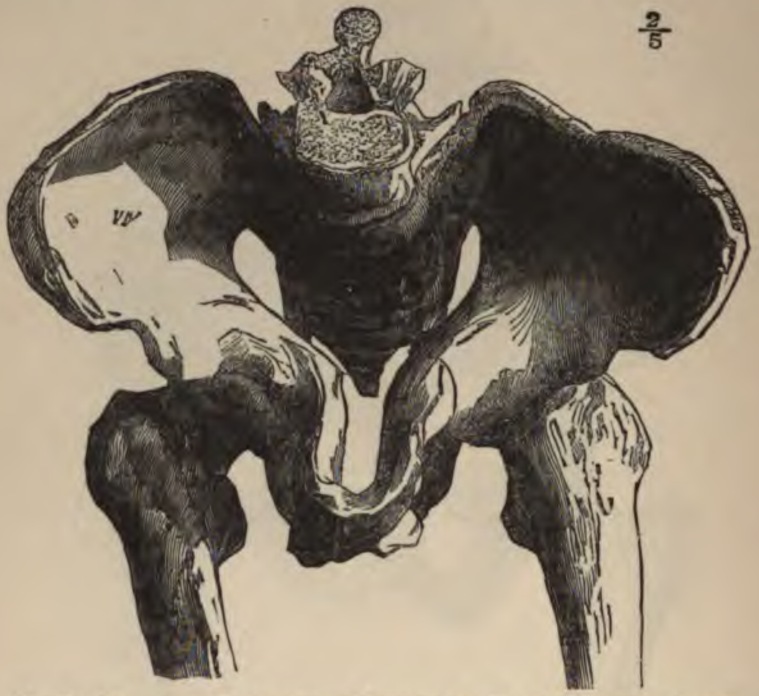

Fig. 39.—Osteomalacic Pelvis of high Degree. The Woman died of the Disease. *(Collection of Stoltz.)*

Osteomalacia is a protracted disease, and at the time of labor the pelvic bones may be so soft as to yield to the pressure of the fœtal head, and thus to allow of normal delivery, but these cases are extremely rare.

Obliquely-oval Pelvis.

Naegelé (1829) was the first to call attention to the obstetrical importance of this deformity, which he described as a shortening of one oblique diameter, with complete anchylosis of one of the sacro-iliac synchondroses, and imperfect development of the corresponding half of the sacrum and ilium. The characteristics of such a pelvis are, therefore:

1. Complete anchylosis of one of the sacro-iliac joints.
2. Arrest of development of the corresponding half of the sacrum.
3. Diminished size of the femur on the same side.
4. The sacrum is pushed over towards the anchylosed side, while, at the same time, the symphysis pubis is drawn towards the opposite side in such a way that it is no longer directly opposite to the sacro-vertebral angle.
5. The lateral wall and corresponding half of the anterior wall of the pelvic cavity, on the anchylosed side, are smoother than normal.
6. The other half of the pelvis is, of course, greatly deformed. The pelvis is obliquely contracted in the direction of the diameter that crosses the one extending from the point of anchylosis to the opposite cotyloid cavity. The distance between the promontory of the sacrum and the upper edge of either cotyloid cavity, as well as that between the top of the sacrum and either ischial spine, is less on the anchylosed side. The distance between the tuberosity of the ischium and the posterior superior iliac spine, on the anchylosed side, and that between the spine of the last lumbar vertebra and the anterior superior iliac spine, are less than those on the opposite side. The walls of the cavity converge in an oblique manner below, and the pubic arch is more or less contracted, while its shape approaches that of the male pelvis. The cotyloid cavity on the flattened side is directed more anteriorly than in a well-formed pelvis, while the opposite one looks almost directly outward.

Frequency.—This deformity is not so very rare, and it often is unsuspected, especially when the patient recovers. Women with such pelves are young, healthy, and otherwise well-formed, so that they present no appearance that would lead us to suspect the presence of the malformation.

Naegelé believes that the condition is due to congenital causes, his theory being based upon the following facts: 1. The complete fusion of the sacrum with the femur, and the absence of all traces of secondary

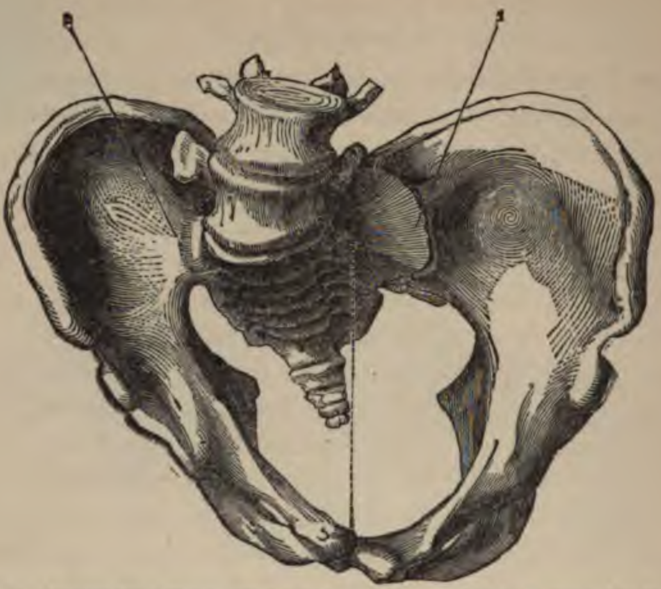

FIG. 40.—OBLIQUE-OVAL PELVIS (*Nichet de Lyon.*) 1. Sound Side. 2. Synostotic Side

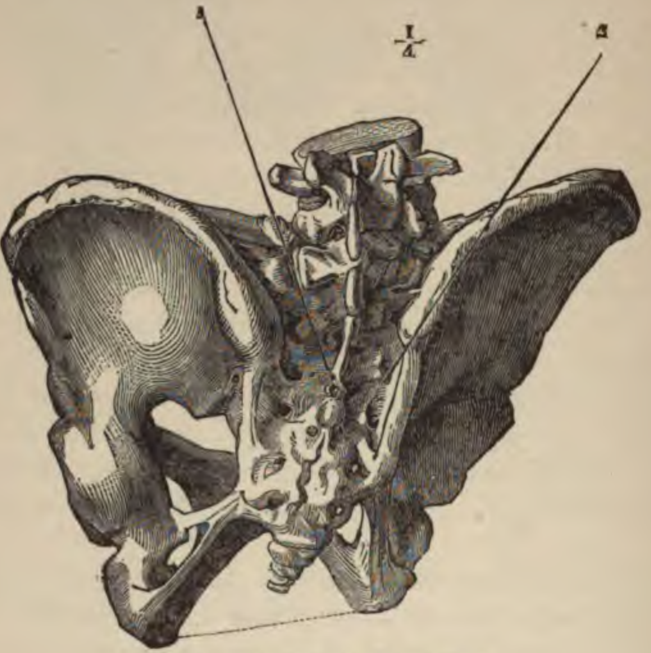

FIG. 41. THE SAME. Posterior Aspect.

anchylosis. 2. Arrest of development of either lateral half of the sacrum, diminution in the size of the corresponding innominate bone, and in the length of the synostosis, as compared with the synchondrosis on the opposite side. 3. The fact that synostoses and deformities in other bones may also be the result of congenital anomalies, and that congenital synostosis is usually added to a malformation of the united bones, which consists especially in arrest of development. 4. The close resemblance between pelves of this type. 5. The absence of every other cause or external influence which could have produced this deformity.

Martin believes that there is first an inflammatory process, then fusion of the femur and sacrum occurs, with induration of the surrounding bone, and the anchylosis preventing the further development of adjacent parts would cause the deviation of the bones, in proportion as these continue to grow. Hohl proved that there might be in these cases entire absence or imperfect development of the centre of ossification of the alæ of the sacrum. Now if the centre is wanting only in the first sacral vertebra, the latter is supplied by the increased development of the centre in the second vertebra. If the centres for the second and third are wanting, there results, necessarily, atrophy of the corresponding side of the sacrum, and in consequence, gradual formation of the obliquely-oval pelvis, without our being able to recognize at any point in the pelvis pathological change.

Simon-Thomas concludes as the result of a series of observations that: 1. In every oblique-oval pelvis anchylosis should be regarded as the primary change, the result of a previous inflammation, which may occur at any time, even in fœtal life. 2. Inflammation may occur primarily in the sacro-iliac joint, in consequence either of internal causes or traumatism, or it may develop secondarily, in consequence of some affection of the neighboring joints (the articulations of the lumbar vertebræ or the hip). 3. If anchylosis occurs after puberty, when the pelvic bones have reached their complete development, simple atrophy of the adjacent bony parts results, the deformity becoming more complete according as the anchylosis takes place late. 4. After the original disease, which caused the anchylosis, has been cured, the traces of a pre-existing joint may be so completely effaced as no longer to be recognized on superficial examination. 5. Other deformities, besides anchylosis, such as obliquity, and contraction of the pelvic canal, flattening of the lateral wall, diminished size of the greater sacro-sciatic notch, scoliosis of the lumbar vertebræ, etc., are secondary lesions, which ought to be attributed, partly to atrophy of the bones, partly to the unequal pressure supported by the two lateral halves of the pelvis, and partly to the necessity of re-establishing the lost equilibrium.

Litzmann opposes these views, and tries to prove that the anchylosis is secondary, being the result of excessive pressure applied at the cotyloid cavity, when the weight of the body is thrown habitually upon one leg. Olshausen agrees with this writer. Schroeder believes that the anchylosis is secondary to inflammation of the joint. This inflammation may be of an acute suppurative form, often associated with caries of the neighboring bones. If the inflammation takes place after the bones have fully developed, the shape of the pelvis is not changed; in these cases anchylosis is not generally complete, and we always see osseous bridges extending between the bones. If the inflammation occurs in infants, before the alæ of the sacrum are formed, the result of the synostosis is an arrest of development of the alæ at the point which it had attained when the inflammation occurred. When the other alæ attains its normal size, the weight of the body is unequally distributed, so that the anchylosed side is exposed to more pressure than the healthy side. If the inflammation occurs during intra-uterine life, congenital anchylosis results, with marked contraction of the alæ of the sacrum on the affected side, and, in consequence of this, arrested development and obliquity of the pelvis. This obliquity is not due to anchylosis alone, but solely to the contraction of the alæ of the sacrum on the corresponding side, whereby the weight of the body is thrown more upon the femur of the affected side, so that the cotyloid cavity approaches the promontory, and the symphysis is displaced to the opposite side. It follows from the preceding that the synostosis does not necessarily result from atrophy of the alæ, but is easily explained in other ways. Oblique deformity, not anchylosis, is the distinguishing feature of these pelves; this may result from hip-disease, amputation of the thigh, or old dislocation. Is anchylosis ever the primary condition? Spiegelberg thinks not. He denies the existence of a congenital failure of development, because the sacro-iliac articulation is formed before any osseous centres exist in the sacral alæ, and because all oblique pelves in which anchylosis exists are already more developed than in the fœtus at term. If anchylosis occur early, it may prevent the growth of the bones around the joint. When synostosis does not take place until after the complete development of the two bones, there is a partial, but not a complete, disappearance of the joint.

What shall we infer from all these theories? That the obliquely-oval pelvis of Naegelé is not a single type, but presents several clearly-marked varieties, which may be reduced to three, viz.: 1. The most frequent form is distinguished by the fusion of the sacrum with the ilia, with consequent atrophy of the bones composing the articulation. (Naegelé's pelvis.) 2. The second variety is characterized by atrophy of the ilium and one-half of the sacrum, but without anchylosis. 3. In the third there is simply oblique contraction, without the other conditions.

The Transversely-contracted Pelvis.

This pelvis is characterized by anchylosis of both sacro-iliac articulations, with absence, or rudimentary development, of the alæ of the sacrum. The sacral vertebræ are straight and the sacrum presents a convexity transversely, instead of its usual concavity. The sacrum is deeply depressed in the pelvis, so that the posterior extremities of the iliac bones project prominently, and the posterior superior spines are closely approximated. There is little, if any, curve to the os innominatum. The iliac bones are flattened anteriorly and unite at a very acute angle at the symphysis. As a result, there is marked lateral contraction, so that the pelvis appears to be composed of the two halves of two obliquely-oval pelves. The principal alteration in these pelves consists in the transverse narrow-

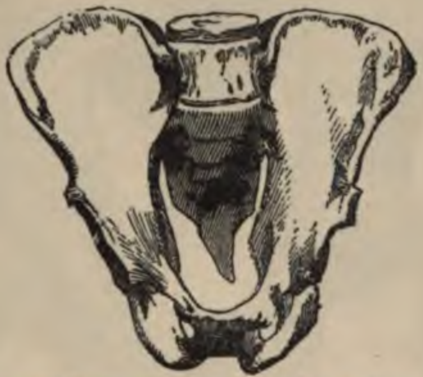

FIG. 42.—TRANSVERSELY CONTRACTED PELVIS, WITH DOUBLE ANCHYLOSIS. (*Robert.*)

ing, which increases from the superior to the inferior strait, so that the latter is in some cases represented only by a long narrow cleft. This variety of pelvis is not very common, only thirteen having been described.

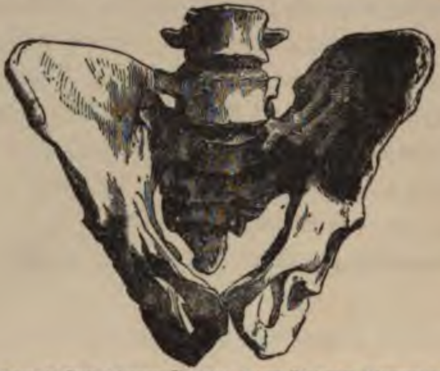

FIG. 43.—TRANSVERSELY CONTRACTED PELVIS, WITH DOUBLE ANCHYLOSIS. (*P. Dubois.*)

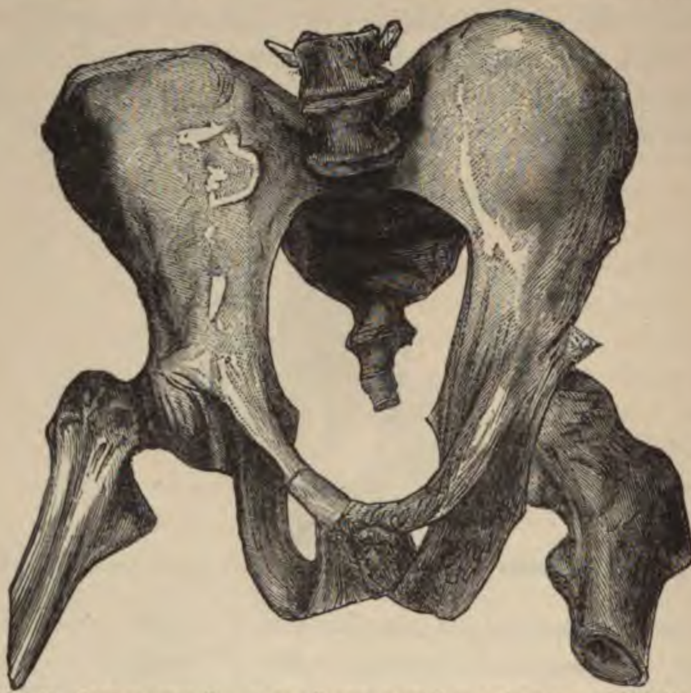

FIG. 44.—TRANSVERSELY CONTRACTED PELVIS, WITH DOUBLE ANCHYLOSIS. (*Martin.*)

According to Schroeder, anchylosis is not the original lesion, but is produced in consequence of the pressure of the trunk; as the sacrum is forced downward under the weight of the trunk friction occurs, which culminates in adhesive inflammation of the sacro-iliac synchondroses, with resulting anchylosis. The pelvis preserves the infantile form, except that the sacrum sinks more deeply into the pelvis, and the ilia, on account of the pressure exerted through the femora, are more approximated, so that the transverse diameters are much shorter in proportion than in the newborn. The sinking of the promontory shortens the conjugate diameter of the brim, but as there is no transverse widening of the pelvis, the symphysis not only does not approach the promontory, but even appears to be thrust forward; the conjugate is thus again increased, so that it generally varies very little from the normal length.

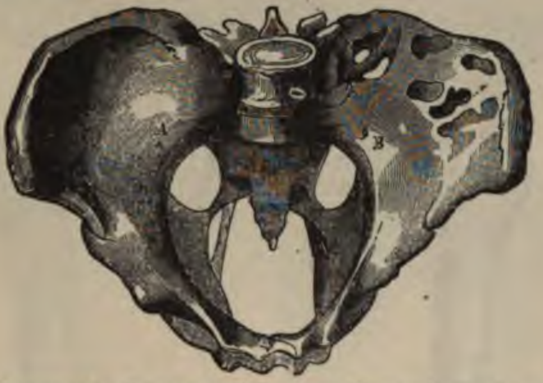

FIG. 45.—TRANSVERSELY CONTRACTED PELVIS, WITH DOUBLE ANCHYLOSIS. (*Depaul.*)

Figs. 46–49 represent a very rare form, described by Naegelé and Grenser. The woman died after the Cesarean section.

Pelves altered by Deviation of the Vertebral Column.—(Lordosis, scoliosis, kyphosis, kypho-scoliosis, kypho-sciolio-rachitic, spondylizema, and spondylolisthesis.)

It is only of late years that the influence of deviations of the spine has really been studied. Cazeaux says: "We must not think that non-rachitic spinal curvature has no influence on the direction and form of the pelvis; but, as a rule, it is only in old subjects that spinal curvatures, that have developed after infancy, produce changes in the shape and direction of the pelvis, so that these possess but slight interest for the obstetrician."

Although rachitic curvatures of the spine are not the principal cause of pelvic deformity, they exaggerate the narrowing and irregular shape of the pelvis. The main alteration consists in a curve from before backward, most marked at the lumbo-sacral junction, in consequence of which the

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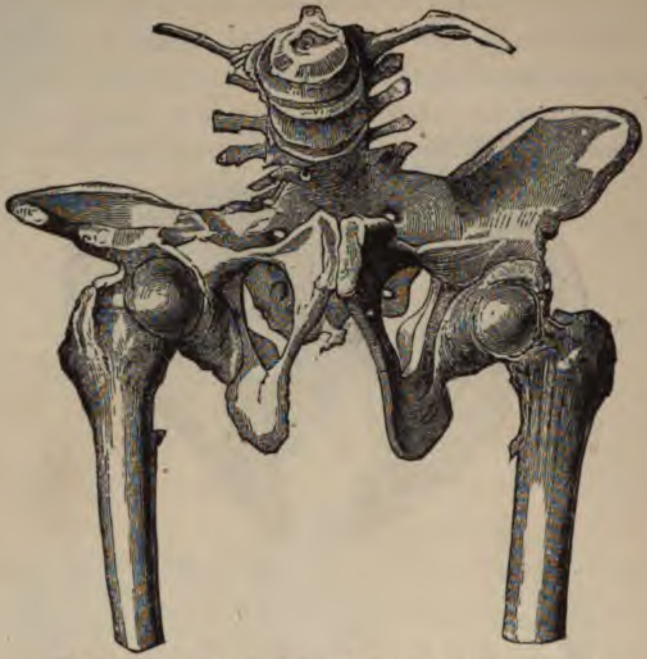


FIG. 46.—KYPHOTIC TRANSVERSELY CONTRACTED PELVIS. (*Lange.*)

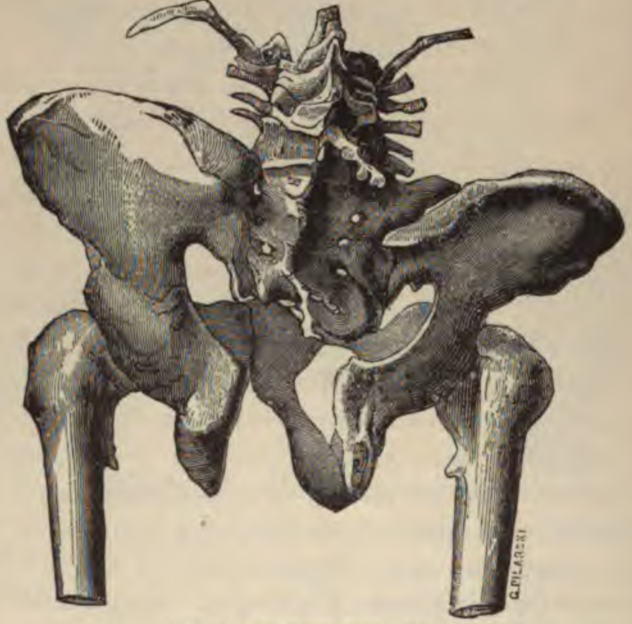


FIG. 47.—THE SAME, POSTERIORLY.

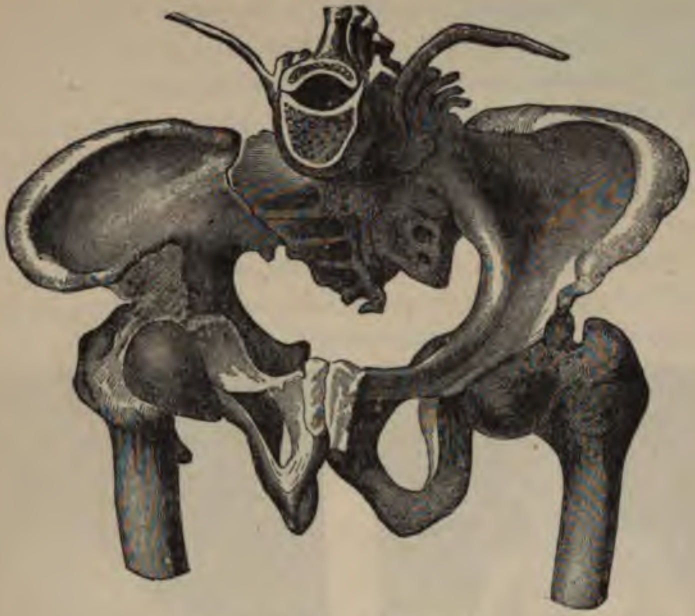


FIG. 48.—THE SAME, SUPERIORLY.

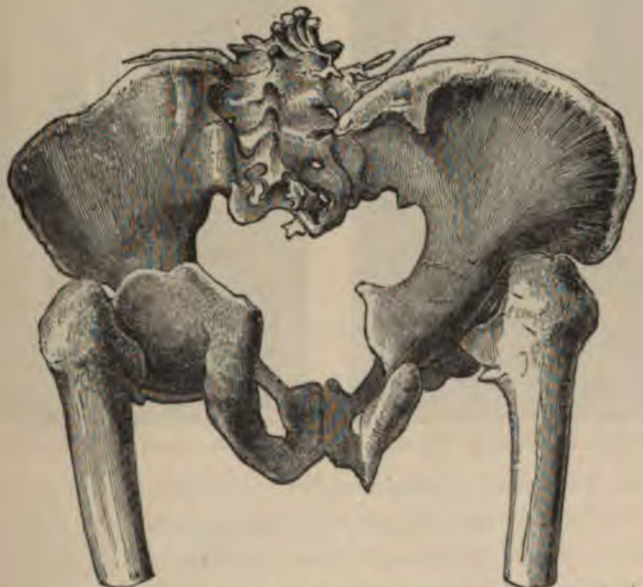


FIG. 49.—THE SAME, INFERIORLY.

pelvis resembles Naegelé's. Choisil, studying pelves with regard to the shortening of the transverse diameter of the outlet, divides them into the following varieties: 1. Pelves deformed by straightness of the vertebral column, by scoliosis, or kyphosis. 2. Obliquely-oval pelves, those deformed by double anchylosis, simple luxation, amputation, arrest of development, and by osteomalacia. He believes, with Pinard, that every curvature of the spine in the young, whether due to scoliosis, or to kyphosis, causes retrocession of the base of the sacrum, leading to lengthening of the conjugate diameter of the brim, and proportional shortening of the transverse diameter of the outlet.

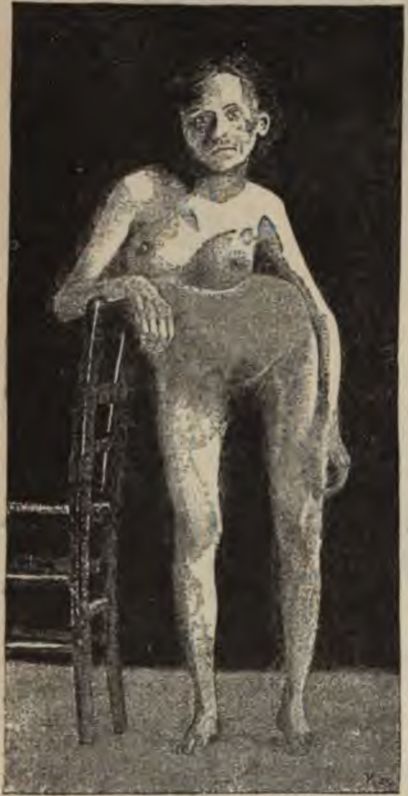


FIG. 50.—SCOLIOTIC, NON-RACHITIC WOMAN.

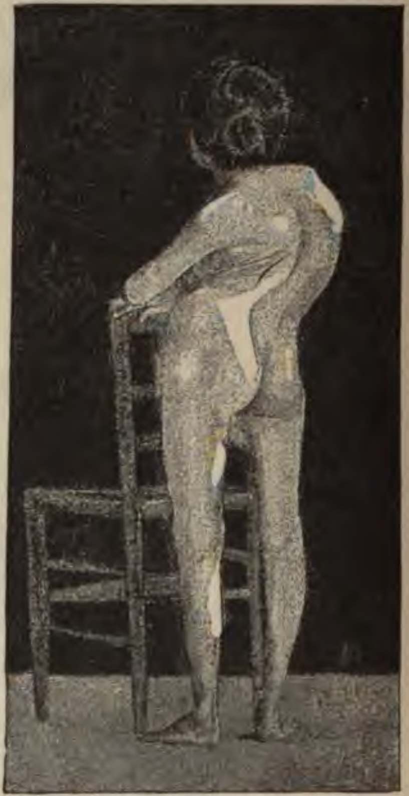


FIG. 51.—THE SAME, POSTERIORLY.

A. *Lordosis and Abnormal Straightness of the Pelvis.*

The normal dorsal and lumbar curves are absent. The S-curve seen in rickets is modified in lumbar lordosis, and disappears entirely in abnormal straightness; in both instances the weight of the body is transmitted to new points, thus modifying the form of the pelvis.

a. *The Influence of Lordosis on the Shape of the Pelvis.*—Increased inclination of the pelvis is the initial change; the anterior part of the pelvis tilts downwards, while the posterior is thrown upwards, this being due to the fact that the patient, when standing, bends forward in order to bring the centre of gravity over a line joining the heads of the femora. When lordosis and rickets are associated the promontory projects more, causing shortening of the antero-posterior diameter.

b. *The Influence of Abnormal Straightness on the Shape of the Pelvis.*—This causes forward displacement of the pelvis, the diameters of the brim not being affected, while those of the outlet are considerably shortened.

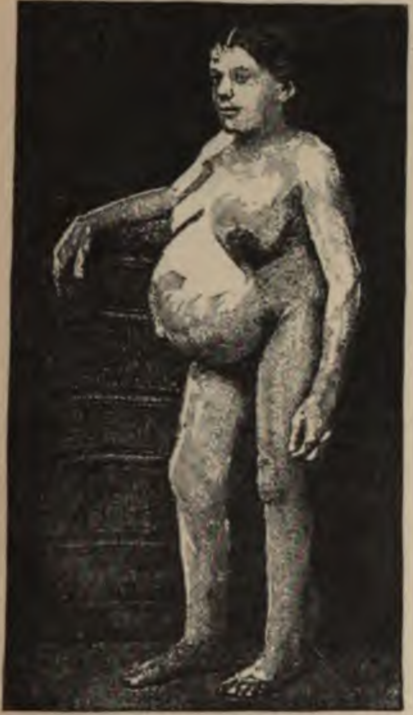


FIG. 52.—SCOLIOTIC, RACHITIC WOMAN.

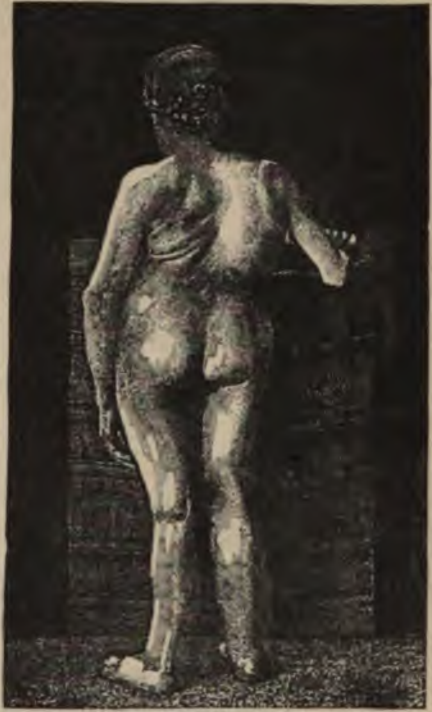


FIG. 53.—THE SAME, POSTERIORLY.

B. *Scoliosis.*

This is a classic deformity of the vertebral column; but we must here make a distinction between rachitic and non-rachitic scoliosis. The latter developes slowly, and affects only the spine (Figs. 50 and 51), while in the former the entire skeleton is involved, so that the pelvis and the limbs, as well as the vertebral column, are affected (Figs. 52 and 53), so that women with these two deformities present appearances entirely dissimilar. In rachitis the limbs are short and curved inward, the women are not only of small stature, but, by reason of the affection of the thorax, are small in general. Moreover traces of rachitis will be found in the skeleton, such as are absent in non-rachitic scoliosis. The pelvic deformity is different in the two cases; it may be but slightly marked in the latter, and may occasion but little difficulty during parturition, while in the former the deformity may be sufficient to constitute a formidable complication to labor. Figures 54 and 55, from Tarnier and Leopold, will show the points of difference.

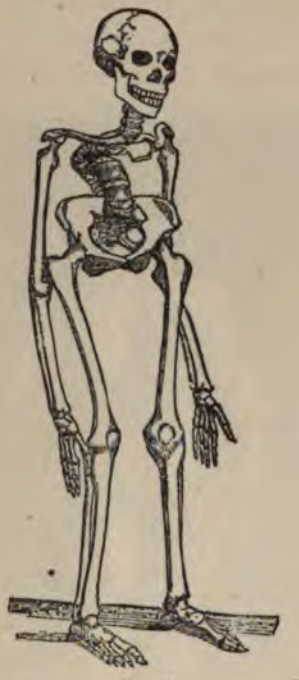


Fig. 54.

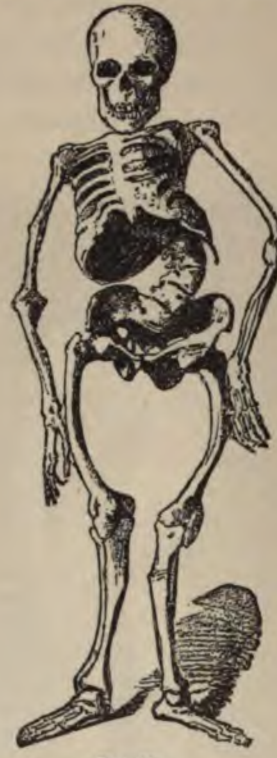


Fig. 55.

Fig. 54.—Skeleton of a Non-Rachitic Scoliotic Woman. (*Cazeaux-Tarnier.*)
Fig. 55.—Skeleton of a Scolio-Rachitic Woman. (*Leopold.*)

a. *Non-rachitic Scoliosis.*

The narrowing is rarely so great as to do any more than to somewhat retard labor; the women are usually delivered spontaneously at term.

Hirigoyen notes the following points, based on an analysis of nineteen cases: 1. There is more or less marked flattening of that half of the pelvis towards which the lumbar deviation inclines, or on which the weight of the trunk is thrown. 2. One of the oblique diameters, together with the corresponding sacro-cotyloid distance, is shortened. The symphysis may deviate slightly, so that there is a tendency to the obliquely-oval type. The contraction is confined to the brim, along the curve of the innominate bones, which is the centre of resistance between the trunk and the femora.

b. *Rachitic Scoliosis.*

Leopold has studied this subject most thoroughly; he has found that this influence is more marked when the individual is attacked with rachitis at an early age, and when she has used her lower limbs. Kehrer and Engel have shown that a certain number of the peculiarities of shape characteristic of the rachitic pelvis exist in the fœtus, or in the infant who can neither walk nor stand; these peculiarities consist in longitudinal and transverse lengthening of the sacrum, in depression of the promontory forward and downward, curving in of the thigh bones, flattening of the ilia, a uniform or triangular shape of the superior strait, and broadening of the symphysis.

Three factors determine the characteristic shape of these pelves, viz.: The pressure and counter-pressure sustained by the pelvis, the traction of the ligaments, and that of the muscles. The degree of asymmetry of the pelvis depends on the degree of the scoliosis. The most striking feature in a scolio-rachitic pelvis is: 1. The forward inclination of the promontory, and the marked shortening of the true conjugate, which varies from two to three and a half inches. 2. The evident shortening of the right oblique diameter of the outlet, which is always shorter than the true conjugate. In the scolio-rachitic the asymmetry is shown at the first by an increase of the distance that separates the anterior superior iliac spine from the ischial tuberosity of the same side; the distance between the anterior and posterior spines themselves is increased. The angle formed by the junction of the ischio-pubic rami is greater than normal. Consequently, the true conjugate is shortened as well as the oblique measurements, the symphysis pubis is displaced towards the side opposite to the lumbar scoliosis. As a result, on this side, the distances which separate the superior and inferior borders of the symphysis from the posterior superior iliac spines are from one-tenth to four-tenths of an inch less than on the side of the lumbar scolioses. Finally, the transverse narrowing of the superior strait, and the inclination of the sacrum on the side of the lumbar scoliosis, cause a shortening of from 12 to 26 per cent. in the distance between one extremity of the transverse diameter and the promontory, as well as that between the former point and the tip of the sacrum.

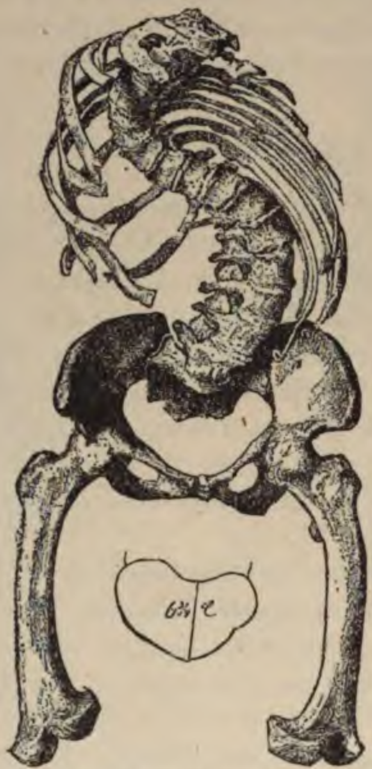


FIG. 56.—SCOLIO-RACHITIC PELVIS; CURVE TO THE LEFT. (*Leopold.*)

Etiologically two questions are to be considered, viz.: Is the rachitic asymmetry primary, and the scoliosis only secondary? May not the asymmetry be due to shortening of one of the lower limbs, and the scoliosis again be simply secondary? Leopold believes that scoliosis is the original lesion, the pelvic deformity resulting in consequence. That does not mean, he explains, that there are not pelves in which arrest of development and atrophy of the sacrum may cause secondary deviation of the vertebræ and consequent modifications in their form. Scoliosis and shortening of the leg produce the same results, that is to say, unequal distribution of the weight of the trunk, so that more pressure is thrown upon one side of the pelvis than upon the other. Primary scoliosis causes more marked deformity than shortening of the lower extremity. Rickets is most apt to cause curvature in the dorsal region; the spine bends towards the right in the majority of cases, the lumbar curve being merely compensatory. As the latter becomes more marked, the pressure increases until the last lumbar vertebræ are sometimes in contact with the posterior surface of the corresponding ilium; the deformity in this case is due directly to the pressure transmitted to the ilium through the spine, and in part, also, to the deviation of the sacrum, which shares in the lumbar curvature. Muscular contraction also influences the deformity. A number of powerful muscles are attached to the pelvis, and, in consequence of the deviation

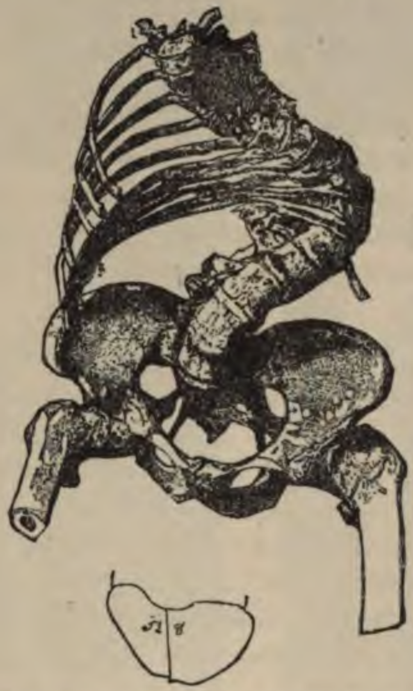


FIG. 57.—SCOLIO-RACHITIC PELVIS; CURVE TO THE RIGHT. (*Leopold.*)

of the vertebral column, these act in a new direction, thus exaggerating the abnormal condition (so as to cause rotation of the ilium around its antero-posterior axis.)

Schroeder does not admit the influence of scoliotic deviation of the spine, except in those cases (which he thinks are the rule) in which the sacrum shares in the compensatory lordosis. He affirms that the promontory is displaced towards one side of the pelvis, and that the iliac bone on the side corresponding to the scoliosis is turned upward, inwards, and backwards, at the same time being straightened, especially in the neighborhood of the cotyloid cavity, while the tuberosity of the ischium is deflected outwards, and the pubic arch is widened. The symphysis is slightly bent on the side opposite to the scoliosis, the line of the innominate bone on the contracted side is a little less curved than normal, while the sacro-cotyloid distance is much shortened. When the scoliosis is exaggerated, the cotyloid cavity may approach so near to the promontory, that the pelvis assumes to some extent the shape of the pseudo-osteomalacic type.

C. *Kyphosis.—Kyphotic Pelves.*

Kyphosis is characterized by anterior deviation of the vertebral column, which may include a large part of the spine, or may be quite circumscribed (true angular curvature), and confined to the dorso-lumbar, lumbar, or lumbo-sacral region. It may be due to localized diseases (caries, tuberculosis, etc.), or to rachitis, hence the following vareties of deformity: 1. The pure kyphotic pelvis. 2. The kypho-scoliotic. 3. The kypho-scolio-rachitic. When Pott's disease occurs during childhood (especially in the dorsal lumbar and lumbo-sacral regions), the pelvic deformity is most marked

a. *Pure Kyphosis.*

Herbiniaux (1785) was the first to clearly describe the deformity; Schroeder, Spiegelberg, Leopold, and others, have since studied it.

A. *Dorso-lumbar Kyphosis.*—In this condition there is marked increase in the transverse measurement of the superior strait, as compared with that of the inferior. It seems as if the iliac bones had revolved about an axis passing through the centres of the cotyloid cavities. The spine has a posterior curvature, the angle of which is almost 90°. (Fig. 59.)

The upper part of the sacrum is carried upwards and backwards, its anterior surface forming with the last lumbar vertebræ a slight convexity; the lower sacral vertebræ unite with the coccyx to form a concavity. The anterior surface forms only a slight curve, as seen in profile. Its posterior aspect is nearly flat, as viewed longitudinally, and occupies a higher plane than the anterior. The sacrum is concave transversely, and the alæ project forwards strongly. The coccyx is revolved around a transverse axis, and is directed backwards in such a way that the iliac fossæ are separated one from the other, while the ischial tuberosities, on the contrary, are nearer together than usual. The pubic arch is narrowed and the angle is more acute than normal. The ilia are more elongated from before backwards, the lines of the ossa innominata are less curved, and the cotyloid cavities are situated more laterally, and incline downwards more than in the normal pelvis. The iliac fossæ are flat, anterior inferior spines well developed, and the S-shape of the crests has nearly disappeared.

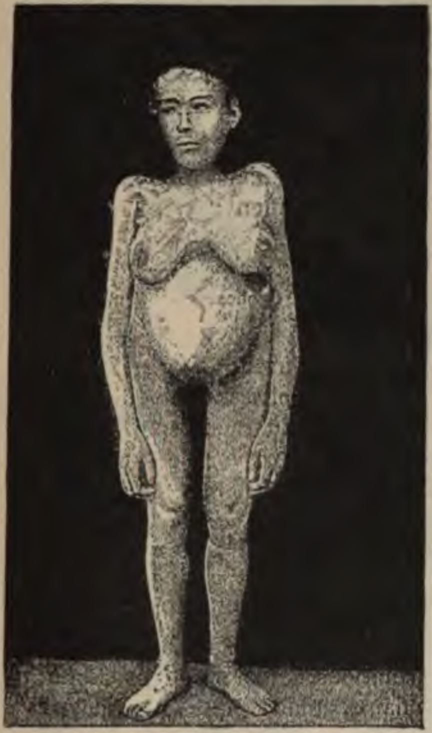


FIG. 58.—PURE KYPHOSIS, FROM POTT'S DISEASE.

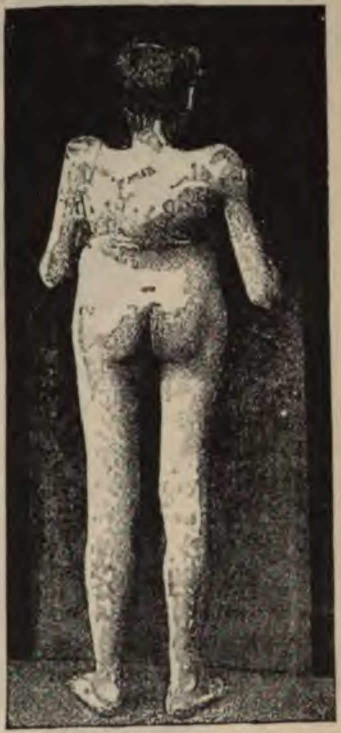


FIG. 59.—SAME WOMAN, POSTERIOR ASPECT.

The pubic rami form an acute angle at their junction, they incline sharply backward; the ischial tuberosities are approximated.

B. *Lumbo-sacral Kyphosis.*—The principal changes are seen in the sacrum. It is diminished in size, the anterior borders of the auricular surfaces project in front of the corresponding surfaces of the ilia; the transverse axis of the bone is shortened at the level of the upper foramina, and the concavity is more shallow, the former themselves are smaller and are separated by irregular intervals. The sacrum has a marked wedge-shape, especially at its lower end; instead of being largest at the level of the superior strait, its greatest breadth is at the first pair of foramina.

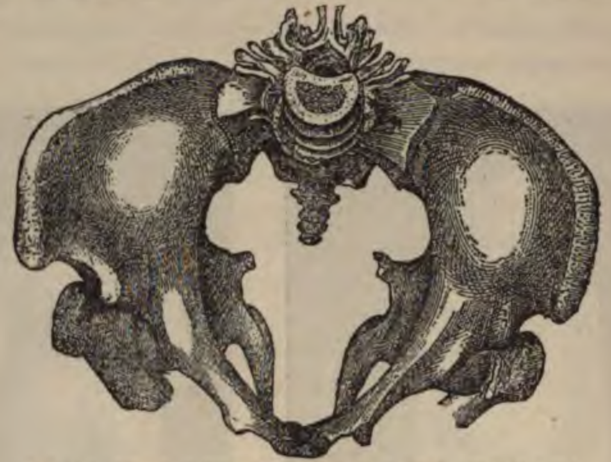


FIG. 60.—KYPHOTIC PELVIS, OF MOOR OF ZURICH. (*Spiegelberg.*)

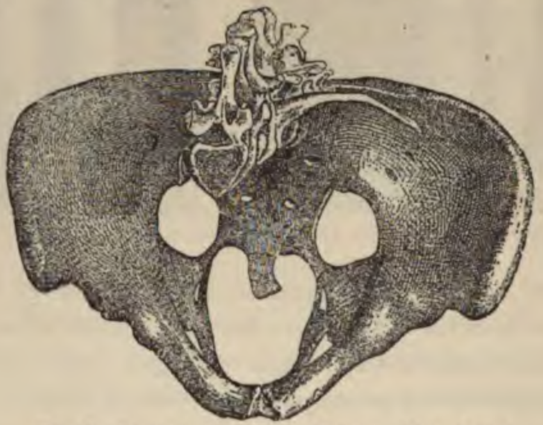


FIG. 61.—STADFELDT'S KYPHOTIC PELVIS. (*Spiegelberg.*)

The deformities of the ilium and pubic bone are similar to those in the dorsal-lumbar variety, but are more marked. The pelvis is funnel-shaped, by reason of the increased size of the false pelvis and superior strait, and the transverse contraction of the inferior strait.

b. *Complicated Kyphosis.*

Kyphosis rarely exists alone; it is usually associated with scoliosis or rachitis, or it may accompany sacro-iliac synostosis, luxation of the femur, etc. We shall describe, with Leopold, the non-rachitic kypho-scoliotic, and the kypho-scolio-rachitic pelves.

1. *The non-Rachitic Kypho-scoliotic Pelvis.* (Figs. 62 and 63.)—When kyphosis and scoliosis are located in the lower dorsal region, kyphosis is the more active factor, but it only affects the sacrum; scoliosis, on the other hand, only causes pelvic deformity when there is a lumbar compensatory curve. When the two lesions are situated lower down, they both influence the deformity, the character of the deformity depending upon the predominating factor.

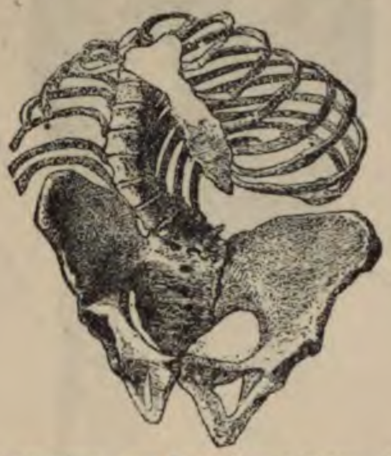


Fig. 62.—Kypho-Scoliosis resulting from Lumbo-Sacral Caries. Anchylosis of the right Sacro-Iliac Symphysis. Funnel-shaped Pelvis, Obliquely Contracted. (*Leopold.*)

2. *The Kypho-scolio-Rachitic Pelvis.* (Figs. 64 and 65.)—Rickets and kyphosis act in precisely opposite directions, so that the deformity is often the resultant of two forces; the condition is often very complex, being modified by the different periods at which each of the forces began

to act (before ossification was complete). Leopold mentions the following features as characteristic of such pelves: The conjugate diameter of the brim is increased if the pelvis approaches the pure kyphotic type, varying from 3.2 to 4.8 inches, while in the scoliotic it does not exceed 3.4 inches. The conjugate of the outlet is absolutely shortened (being at least $\frac{8}{10}$ in. less than normal). The sacrum is increased in length and is more elevated than in the rachitic pelvis. The distance between the anterior superior iliac spines is relatively increased, being equal to or greater than that between the crests. The transverse diameter of the brim is relatively greater, while that of the outlet is shorter; the oblique diameters are lengthened, as compared with those of the scolio-rachitic pelvis, and, in consequence of asymmetry of the pelvis, are unequal. The sacro-cotyloid distances are relatively increased, according to the amount of unilateral pressure.

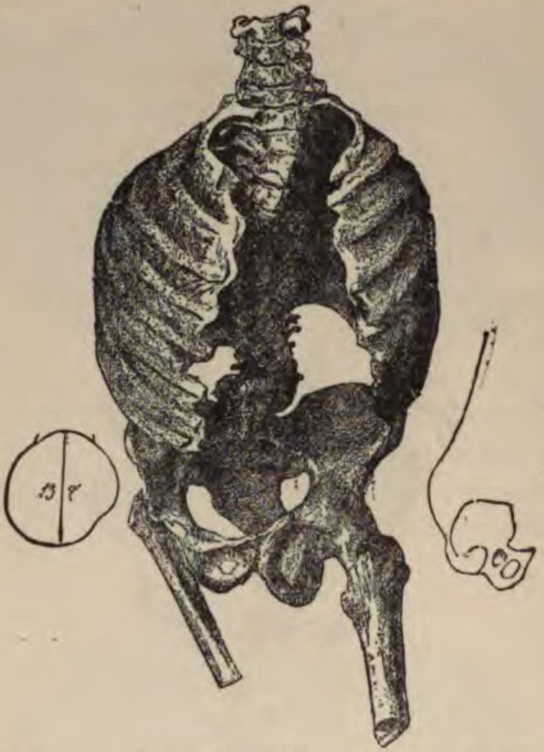


FIG. 63.—KYPHO-SCOLIOSIS FROM LUMBAR CARIES. PELVIS ATROPHIED ON THE RIGHT, CONTRACTED ON THE LEFT, AT THE SUPERIOR STRAIT. FUNNEL-PELVIS, NO RICKETS. (*Leopold.*)

The pelvis is accordingly funnel-shaped, that is to say, its form is exactly the opposite of the rachitic pelvis. The funnel, in the most symmetrical forms, decreases regularly from the brim to the outlet; in the asymmetrical, however, the contraction is confined more to the right oblique and transverse diameters.

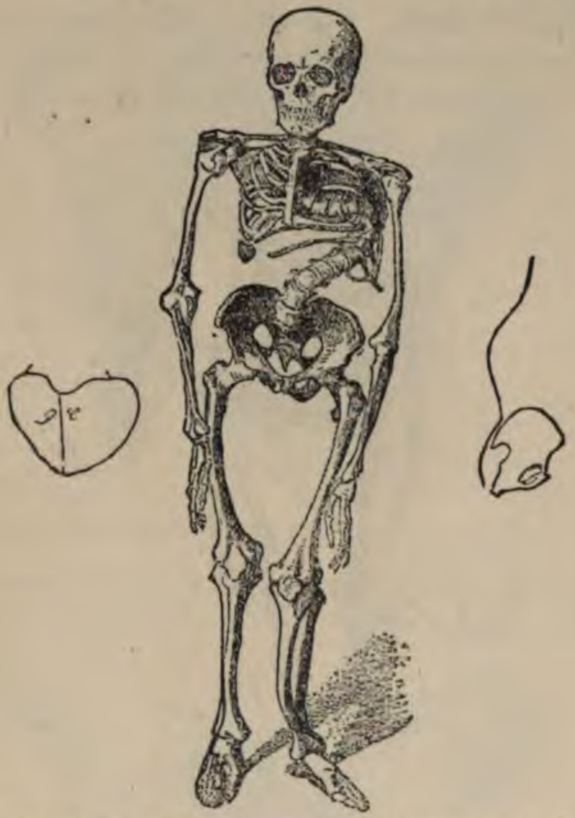


FIG. 64.—KYPHO-SCOLIO RACHITIC PELVIS. SUPERIOR STRAIT CONTRACTED TO THE RIGHT. INFERIOR STRAIT CONTRACTED. FUNNEL-SHAPED PELVIS. (*Leopold.*)

D. *Spondylolisthesis.—Spondylizema.*

Kilian (1854) was the first to describe a peculiar deformity of the pelvis, characterized by sinking of the vertebral column into the pelvic cavity; Hergott (1877) showed that the condition was due to destruction of the bodies of one or more of the lumbar or sacral vertebræ, as a result of

Pott's disease, in consequence of which the support of the column was weakened, so that it sank downwards and forwards, obstructing the pelvic entrance in such a manner as to prevent the engagement of the presenting part of the fœtus—in short that the true condition was spondylizema, not spondylolisthesis. The difference between this form of pelvis and the normal is produced by the modified form of the sacrum, especially its manner of articulating with the lumbar vertebræ, and the consequent deviation of the lumbar spine. The sacrum is shortened in such a way that it appears to have been cut off at the upper third of the first vertebra in a plane parallel with the conjugate, so as to leave a projecting angle. Instead of the vertebral column forming with the sacrum the usual projection, known as the promontory, it unites with the shortened bone in such a manner as to form an obtuse angle, opening anteriorly, thus prolonging and exaggerating the sacral curve. There results, in consequence, a projection of the spine, so great that the upper part of the third verte-

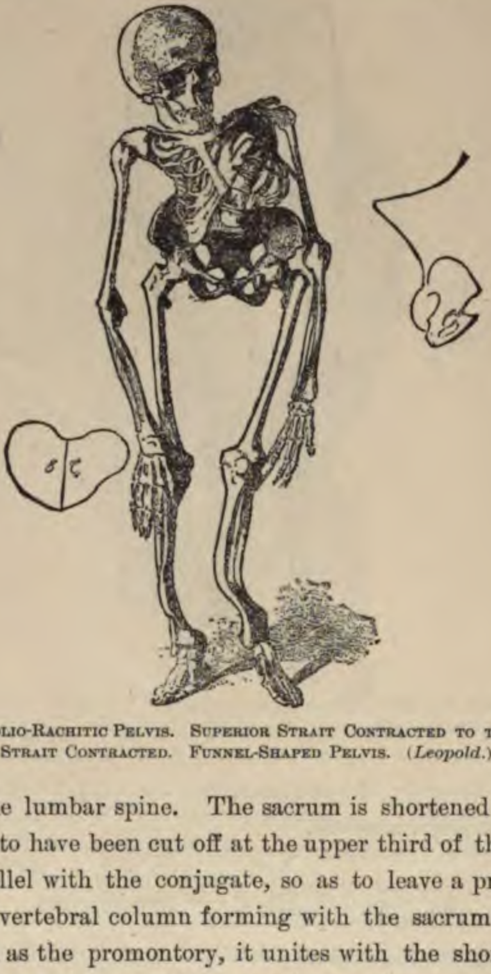


FIG. 65.—KYPHO-SCOLIO-RACHITIC PELVIS. SUPERIOR STRAIT CONTRACTED TO THE LEFT. INFERIOR STRAIT CONTRACTED. FUNNEL-SHAPED PELVIS. (*Leopold.*)

bra is separated from the pubes by a space of only 3.2 inches. This striking change in the direction of the column is in consequence of the depression of the sacrum and the almost complete disappearance of the fifth lumbar vertebra; there remains of the latter bone only the arch and the spinous process, together with the transverse processes, and the surfaces that articulate with the sacrum and the fourth lumbar vertebra. The body of the fifth vertebra is represented merely by a wedge, $\frac{7}{10}$in. broad at its base, and $\frac{3}{10}$ in. at its anterior border; the fourth vertebra articulates

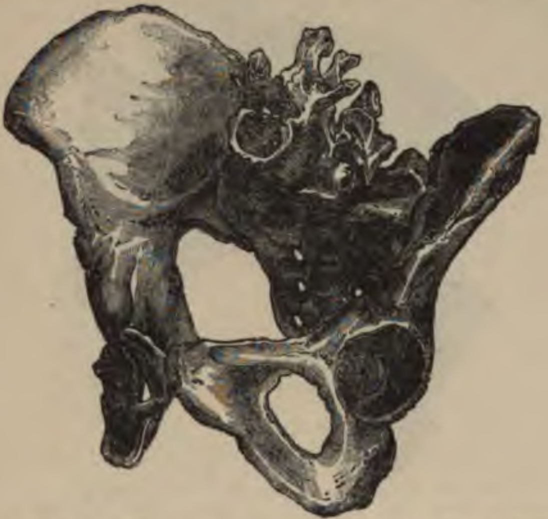


FIG. 66.—STOLTZ'S SPONDYLIZEMATIC PELVIS. Anterior View. (*Didier.*)

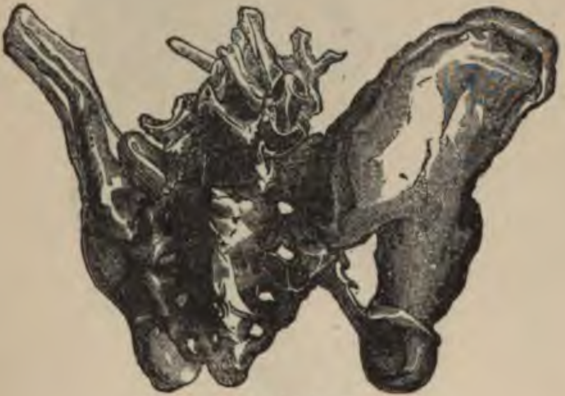


FIG. 67.—THE SAME, POSTERIORLY.

directly with the sacrum. When the pelvis is held at its normal inclination (so that the conjugate forms an angle of 55° with the horizon), and is brought to a level with the eyes, we see the upper surface of the third

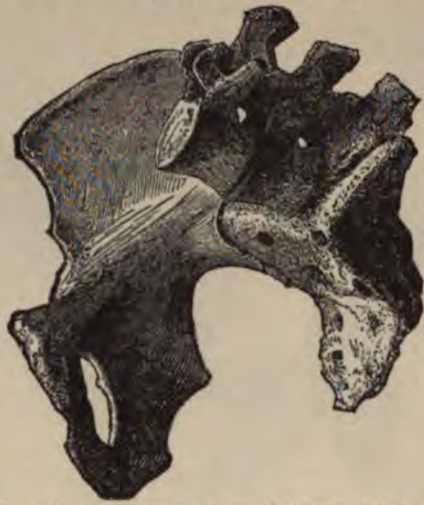


FIG. 68.—RIGHT SIDE OF STOLTZ'S PELVIS. (*Didier.*)

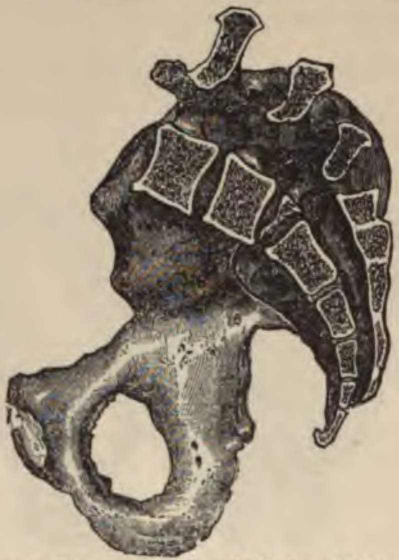


FIG. 69.—SECTION THROUGH STOLTZ'S PELVIS. (*Didier.*)

vertebra covering the one beneath; we observe that the shortened spinal column conceals the upper half of the sacrum, and encroaches on the pelvic cavity, while we also see the spinous and transverse processes of the third vertebra exactly covering the corresponding processes of the two vertebræ beneath.

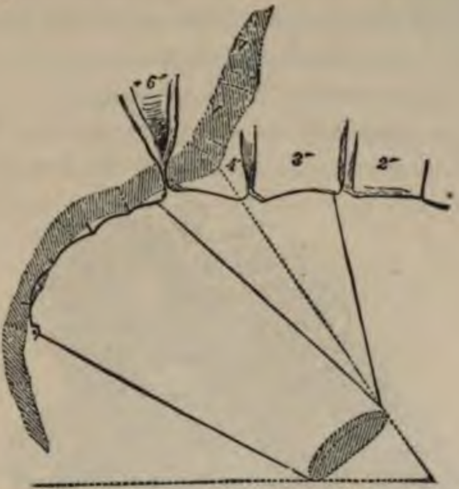


FIG. 70.—SECTION THROUGH STOLTZ'S PELVIS, AND THROUGH A NORMAL PELVIS, THE ONE ABOVE THE OTHER (*Herrgott.*)

2. *Fehling's Pelvis.*—The most striking feature in this variety is an anterior curvature of the spine, so excessive that it approaches within 1½ in. of the symphysis, while the angle that it forms with the conjugate,

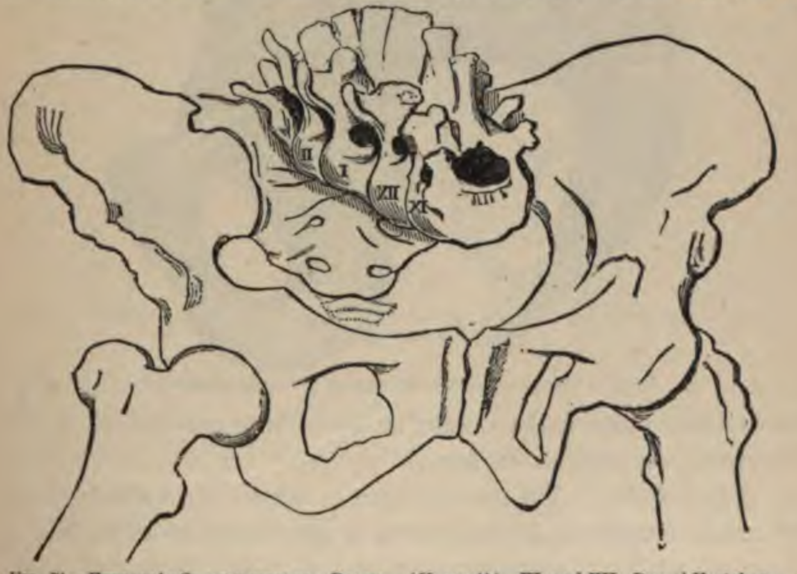


FIG. 71.—FEHLING'S SPONDYLIZEMATIC PELVIS. (*Herrgott.*) XI. and XII., Dorsal Vertebræ. I. and II., Lumbar Vertebræ.

is only 15.° Of the lumbar vertebræ, only the first and second remain, while in the place of the other three is a small, irregular mass, thicker on the right than on the left side, forming a wedge which is broad behind and narrow in front, interposed between the sacrum and the body of the second lumbar vertebra. The important point to note is that the vertebral arches are preserved, since there are seven spinous, and seven pairs of transverse, processes. One-half of the first sacral vertebra is absent, which explains the sinking of the column into the pelvic brim. This produces a true *pelvis obtecta*.

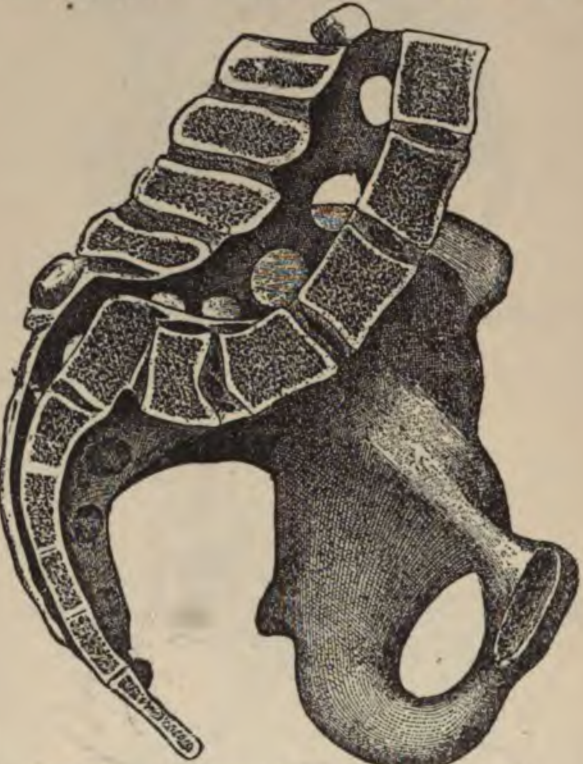


FIG. 72.—SPONDYLOLISTHESIC PELVIS, AT PRAGUE. (*Kiwisch.*)

3. *Belloc's Pelvis.*—The spinal column in this specimen was fused with the anterior surface of the sacrum at a right angle, so that when the woman was sitting, the posterior surface of that bone formed the base of support, instead of the ischial tuberosities.

4. *Gluge's Pelvis.*—In this specimen the promontory was formed by the fourth lumbar vertebra; the sacrum was greatly shortened

5. *Olshausen's Pelvis.*—Here the upper sacral vertebra was destroyed, and below the fourth lumbar vertebra there was a rudimentary one $\frac{8}{100}$ in. broad, the upper border of which projected so far into the pelvis as to shorten the conjugate diameter to $3\frac{8}{10}$ inches.

We see from the foregoing that it is the body of the vertebra that is destroyed, while the arches and articulating processes are more or less preserved. The spine does not glide forward, but first sinks downward, and then rotates forward so as to cover more or less completely the superior strait, the promontory being replaced by an acute angle, the narrowest part of the pelvis being the distance between the symphysis and the most projecting point of the lumbar spine, instead of the normal sacro-pubic measurement.

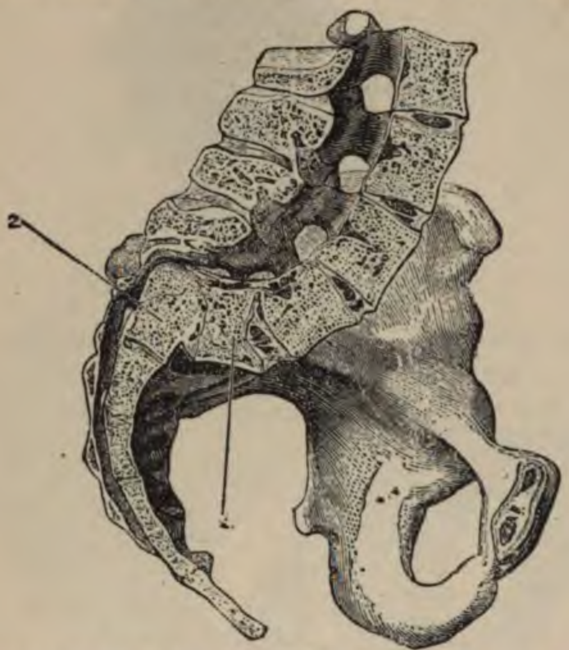


FIG. 73.—SPONDYLONISTHESIC PELVIS OF PADERBORN. (*Kilian.*) 1. Fifth lumbar vertebra. 2. First sacral vertebra.

In the pelvis at Prague (Fig. 72) only a trace of the arch of the fifth lumbar vertebra was found, but no spinous process. In Paderborn's specimen (Fig. 73) the sacrum seemed to have executed a considerable movement of flexion; the summit of the exaggerated angle formed by that bone, corresponded to the junction of the second and third sacral vertebræ. The body of the fifth lumbar vertebra presented a notch on its inferior surface, in which was received a corresponding projection on the anterior border of the first sacral vertebra; the spinous process of the former vertebra was represented by a small tubercle, and of the arch and the articular processes only traces remained. In a specimen described by Spaeth, the first sacral vertebra had entirely disappeared, and only one-half of the fifth lumbar remained, the inferior border of which rested on the third segment of the sacrum. In the Munich pelvis the intervertebral cartilage between the fifth lumbar and first sacral was absent, the two vertebræ being fused together and forming a projection.

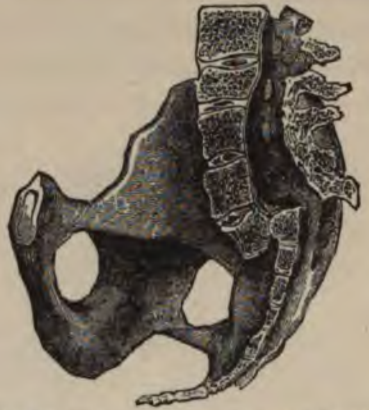


FIG. 74.—SPONDYLOLISTHESIC PELVIS. (*Munich.*)

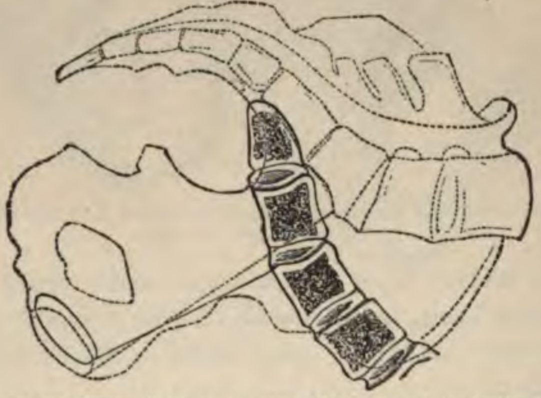


FIG. 75.—SECTION OF THE ZURICH SPONDYLOLISTHESIC PELVIS, WITH NORMAL PELVIS SUPERIMPOSED.

In Olshausen's pelvis the symphysis was on a level with the third lumbar vertebra, the conjugate measuring 1$\frac{4}{10}$ in.; the fifth lumbar vertebra was united to the anterior surface of the sacrum, a small body being interposed between them, which Olshausen supposed to be the remains of the interarticular cartilage. Ebenhoff (of Prague) had two specimens. (Figs. 76 and 77.) In one the lower border of the anterior surface of the fifth lumbar vertebra was anchylosed to the sacrum at a point opposite to the junction of the second and third segments. The anterior surface of the first sacral segment was fused with the first lumbar. In the other pelvis the bones were all light and spongy; the spinous process of the third lumbar was free, that of the fourth was closely applied to the process of the fifth and united to it by fibrous tissue.

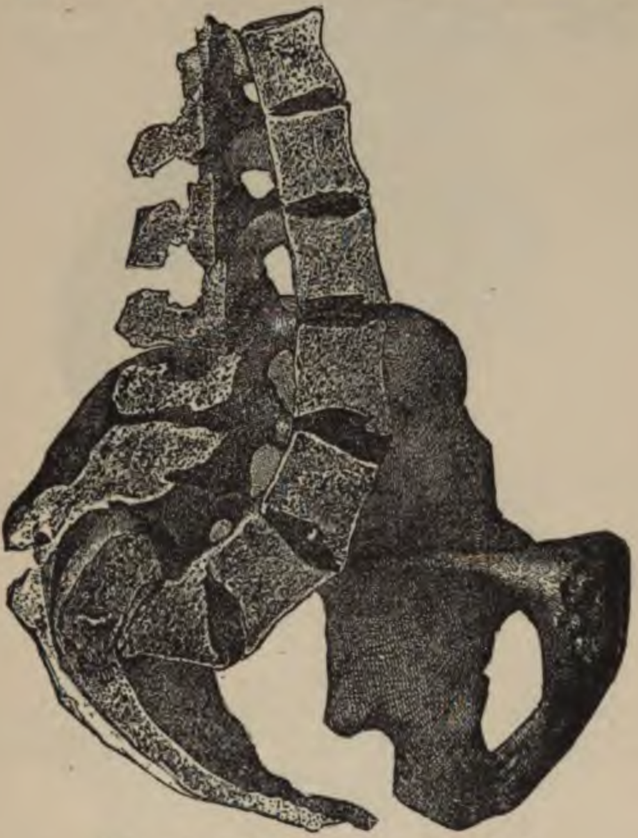


FIG. 76.—EBENHOFF'S FIRST PELVIS. (*Spiegelberg.*)

In Depaul's pelvis (Fig. 79) the sacrum was smaller than normal, its anterior surface porous and the bone generally rough and uneven. The first segment was rudimentary, and was fused with the fifth lumbar; the fourth anchylosed with the fifth. The sacrum and last two lumbar vertebræ appeared to form a single bone; three large spinous processes existed, the first two belonging to the last two lumbar, while the third projected from the remains of the first sacral segment. In the pelvis described by Howitz, of Copenhagen, the lumbar vertebræ were inclined forwards, in consequence of the atrophy of the bodies of the fifth lumbar and first sacral and sinking of the body of the fourth into the sacral canal. (Fig. 80.)

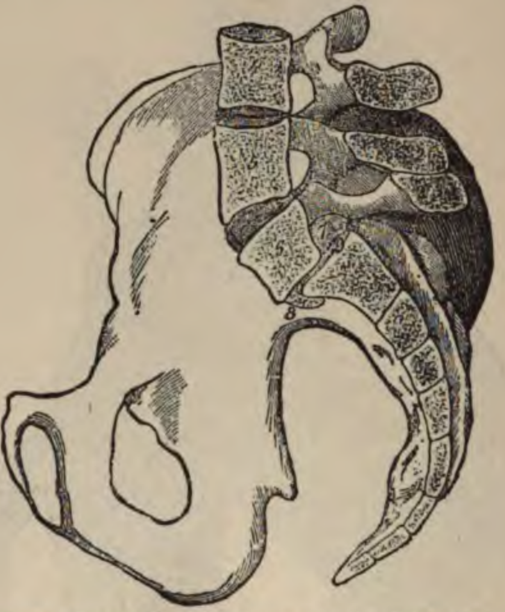


FIG. 77—EBENHOFF'S SECOND PELVIS. VERTICAL SECTION. 1, 2, 3, Spinous processes of the three last Lumbar Vertebræ. 4, 5, 6, Bodies of the last Lumbar. 8, Anterior Border of superior surface of 1st Sacral Vertebræ, pushed forwards. 9, Portion of intervertebral Cartilage, pushed forwards. (*Herrgott.*)

Van den Boschen's pelvis was asymmetrical, the right half being smaller than the left. The right ascending pubic ramus was a little more inclined than the left, its lower border being turned outwards. The bones, especially the sacrum, were quite light and porous. The fifth lumbar vertebra was alone preserved, so that the conjugate was represented by a line drawn from the upper border of the symphysis pubis

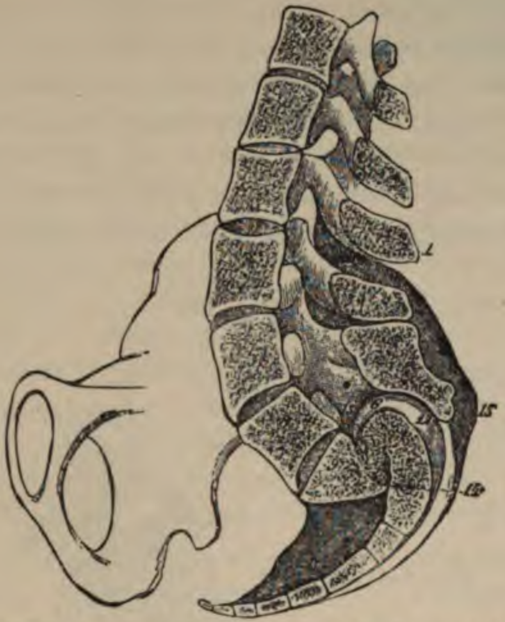


FIG. 78.—EBENHOFF'S FIRST PELVIS, RIGHT SIDE, VERTICAL SECTION. 1 to 5, Spinous processes of Lumbar Vertebræ. 7, 8, 9, Bodies of Lumbar Vertebræ. 6, 12, Sacral Canal. 15 Projection of Spinous Process of Sacrum.

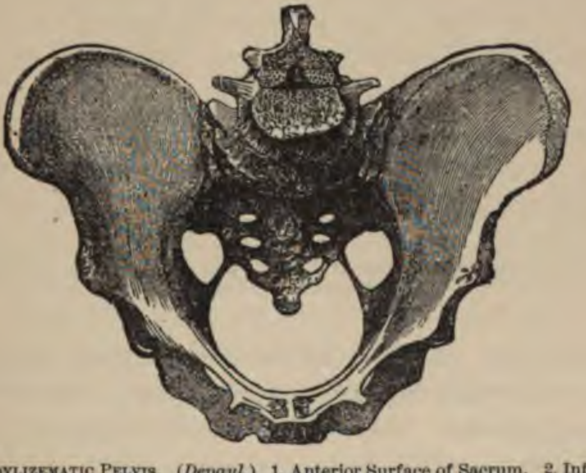


FIG. 79.—SPONDYLIZEMATIC PELVIS. (*Depaul.*) 1, Anterior Surface of Sacrum. 2, Inferior Surface of the body of the last Lumbar Vertebra, and remains of the first Sacral. 3, Section of 5th Lumbar. 4, Body of 4th Lumbar.

to the point of articulation between the second and third lumbar vertebræ, its length being about two inches, while the distance between the most prominent part of the sacrum and the lower border of the sacrum was five inches. The first sacral segment, and a small portion of the second, were situated behind the fifth lumbar vertebra; the sacrum was rotated slightly on its transverse axis, so that its lower extremity was turned forwards and its base backwards. The fifth lumbar vertebra had sunk into the cavity, its anterior aspect having become inferior, and almost horizontal; the upper surface looked almost exactly forwards, while the lower, which originally articulated with the base of the sacrum, had become posterior. The vertebral column united with the sacrum at a right angle, so that when the woman was seated, the posterior surface of the latter bone formed the base of support, instead of the ischial tuderosities, which were directed forwards and a little downwards.

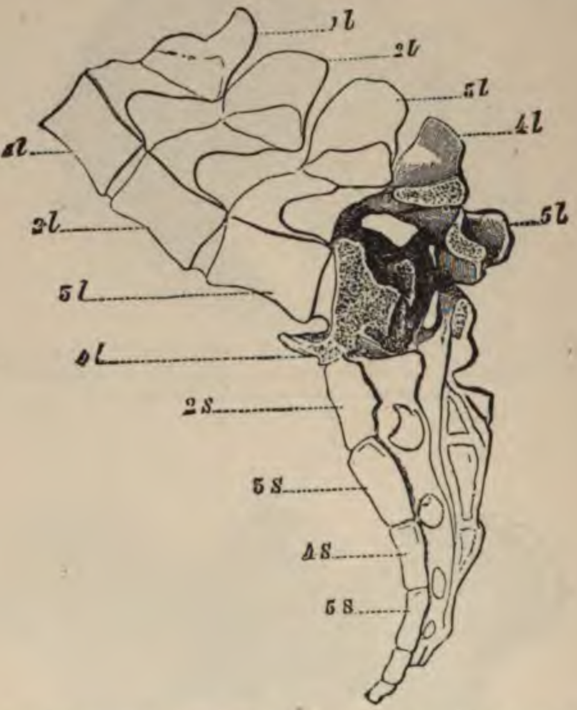


FIG. 80.—SPONDYLOLISTHESIC PELVIS OF HOWITZ. (*Herrgott.*) 1l to 5l, Lumbar Vertebræ. 2s to 5s, Sacral Vertebræ.

In a case observed by Perroulaz (1879), the existence of a spondylolisthesic pelvis was demonstrated in a pregnant female, who was delivered three times with the forceps, once by version, and once by craniotomy. In this instance the fifth lumbar vertebra was displaced downwards and forwards into the true pelvis, and could be easily recognized by the touch. The spine was curved to the left, resulting in contraction of the corresponding half of the pelvis. The conjugate diameter of the brim was $3\frac{6}{10}$ inches, that of the cavity $2\frac{8}{10}$ inches, while the contraction at the outlet was confined to the right oblique and transverse diameters.

The total number of spondylolisthesic, or spondylizematic, pelves amount to twenty-nine, so that this deformity is really very rare. What is the true cause of it? While Kilian regards the deformity as caused by dislocation of the last lumbar vertebra forwards, due to the presence of a supplementary and rudimentary vertebra, which is sunk like a wedge in the posterior part of the sacro-lumbar articulation, and Braün thinks that it is due to the intercalation of an arch of one of the lumbar vertebræ, Lambl believes that the original cause is a lumbo-sacral meningocele. Spiegelberg adopts the latter theory, but Breslau opposes it. Schroeder affirms that the condition is due either to separation of the articular surfaces of the first sacral and last lumbar vertebræ, with gliding of the latter bone on the former, or to dislocation of the latter, or, finally, to solution of continuity of the articular processes (fracture or caries). Herrgott has proved that all of these writers are in error, the deformity being due in every case to Pott's disease. The following are his deductions: Disease of the lumbar spine and sacrum may produce two essentially different deformities, according as the body, or arch, of the vertebra is the seat of caries. If the former is destroyed, the support of the spinal column is weakened, it sinks downwards and forwards, blocking up the pelvic brim (spondylizema, or sinking of the spine). If the arch is destroyed, the column glides downwards into the pelvic cavity (spondylolisthesis, or gliding of the spine). In the former case the normal sacro-pubic diameter is either preserved, or even increased, but the diameter of the actual strait through which the fœtus must pass is represented by a line extending from the pubes to the body of the most projecting lumbar or dorsal vertebra. In spondylolisthesis this distance is shortened, because, by reason of the gliding of the column, the body of a vertebra is interposed between the sacrum and the pubes.

Pelves distorted by Reason of Deformity of the Lower Limbs.

The lower limbs may be altered either in their relation to the pelvis, or in their length and direction. Moreover, these lesions may be primary, dating from infancy, or they may be produced after the skeleton has attained to a great extent its normal development. There are two principal types, viz.: 1. Shortening in consequence of luxation of the femur. 2. Shortening where the head of the femur remains within the cotyloid cavity, as in atrophy of the leg, rickets, fractures, club-foot, knock-knee, flexion with anchylosis, and after amputations and resections.

The Pelvis with Dislocated Femur.

This may be unilateral or bilateral. Sédillot was the first to point out the modifications in the form of the pelvis caused by congenital luxation of the femur. He summarizes as follows: In double luxation the superior strait is heart-shaped, the conjugate being slightly increased. The transverse diameter of the outlet is much longer than the antero-posterior, which is shortened, while the pubic arch is much enlarged. These changes are due to the traction of the muscles in a direction upwards and outwards. The depth of the pelvis is diminished. If the dislocation is unilateral, the deformity is confined to the corresponding side of the pelvis.

a. *Unilateral Dislocation.*

The pelvis is asymmetrical, the half corresponding to the dislocated limb being less developed, its pubic portion being slightly depressed, and turned backward, the corresponding oblique diameter is sensibly shortened, as well as the sacro-pectineal distance. The sacro-iliac articulation on the dislocated side is situated more posteriorly than the other, the sacrum being deviated slightly towards the affected side. The pelvis is usually inclined on this side, and the lumbar spine presents in some instances a slight antero-lateral convexity in this direction. The pubes present a depression a few hundredths of an inch to one side of the symphysis, in consequence of which the depth of the sub-pubic arch is lessened; the length of one horizontal ramus is much increased, while the anterior border of the iliac wing is diminished. The tuber ischii is rotated outwards, the ischio-pubic ramus being slender, flattened, elongated, and straightened, the result being marked obliquity of the pubic symphysis on the affected side, widening of the pubic arch at the expense of its depth, with increase in the sub-pubic angle. The distance between the ischial tuber-

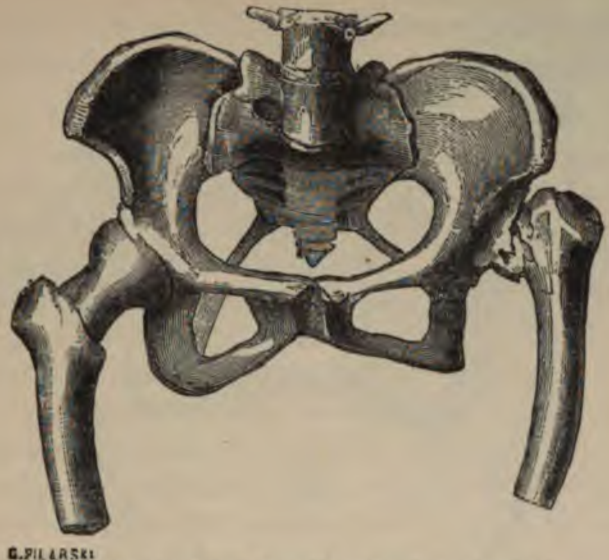


FIG. 81.—PELVIS WITH UNILATERAL LUXATION. *(Depaul.)*

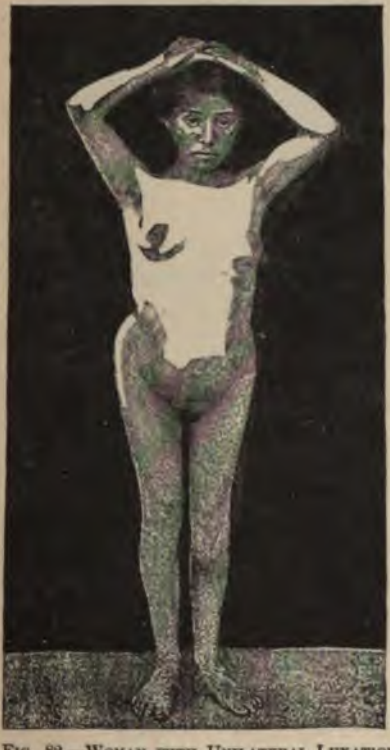


FIG. 82.—WOMAN WITH UNILATERAL LUXATION.

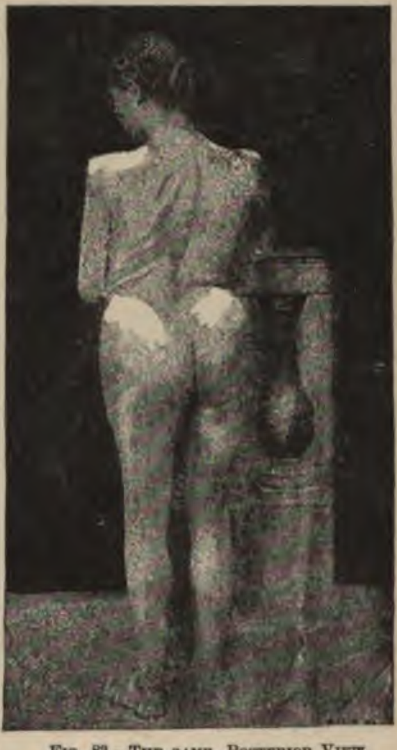


FIG. 83.—THE SAME, POSTERIOR VIEW.

osity and the middle of the iliac crest is shorter on the affected side; the corresponding cotyloid cavity is shallow, contracted, and deformed.

b. *Double Congenital Dislocation.*

In this pelvis there is a striking symmetry in the deformity. The pelvis is inclined forwards so far that the axis of the cavity sometimes becomes horizontal, while the plane of the superior strait is vertical. The iliac wings are straightened, their anterior vertical borders are very thin, with small spines, flattened from without inwards; the iliac fossæ are more shallow than normal. (Figs. 84, 85, 86.) The true pelvis resembles closely that in unilateral dislocation; the ischia, with their tuberosities, are rotated outwards, the transverse diameters of the cavity and outlet being consequently lessened. The pelvis is shallow, the sacro-coccygeal curve is increased, as well as the anterior projection of the spine, and the original cotyloid cavities are contracted and deformed. The most important result of these deformities is the changed relation between the various pelvic diameters. The transverse diameters of the cavity and brim are often diminished, while that of the outlet is much increased; the pelvis, as a whole, therefore, represents imperfectly a truncated cone, with the base at the perineum.

As Sédillot observes, the foregoing deformities are explained by the abnormal relations which the femora bear to the iliac fossæ. The latter are compressed from side to side, the result of which is shortening of the transverse diameter of the brim, without change in the conjugate. At the inferior strait, the effects are, as it were, inverse, since they are due chiefly to fibrous and muscular traction. The influence of the iliacus muscle is particularly important.

c. *Pelves in which the Head of the Femur preserves its normal Relations with the Cotyloid Cavity, although there is shortening of one or both of the Lower Limbs.*

The deformity is usually confined to the sound side, that is to say, the side which, in standing or walking, supports the greater weight. In consequence of this unequal pressure, transmitted through the head of the femur, the iliac curve on the corresponding side becomes more or less straightened, while the pelvis inclines toward the sound limb, all the corresponding oblique diameters being shortened. This lateral compression is usually slight, and does not retard delivery at full term. Nine cases have been reported by various writers.

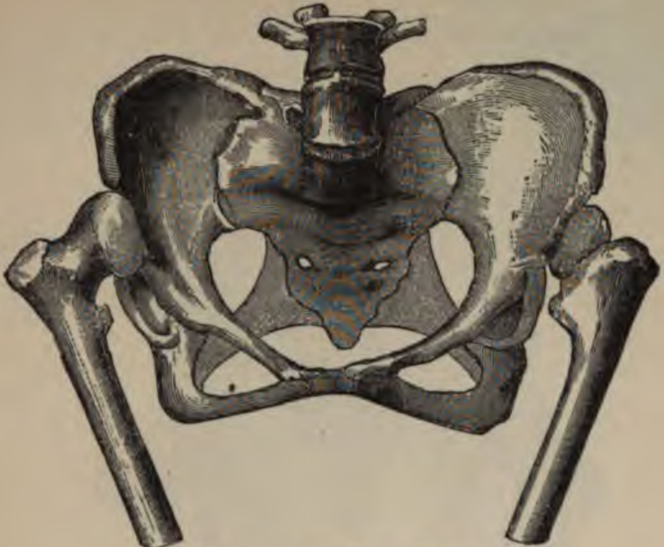


FIG. 84.—PELVIS WITH DOUBLE LUXATION.

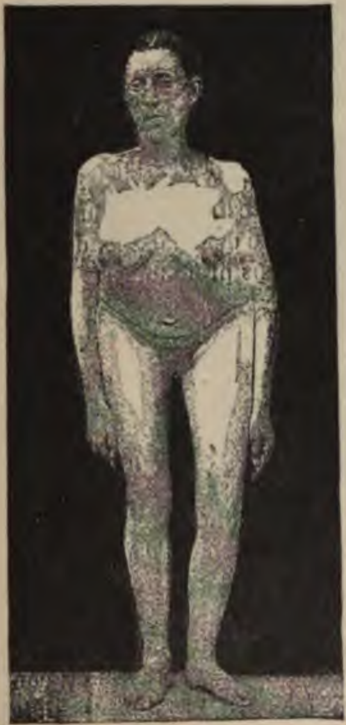


FIG. 85.—WOMAN WITH DOUBLE LUXATION OF THE FEMURS.

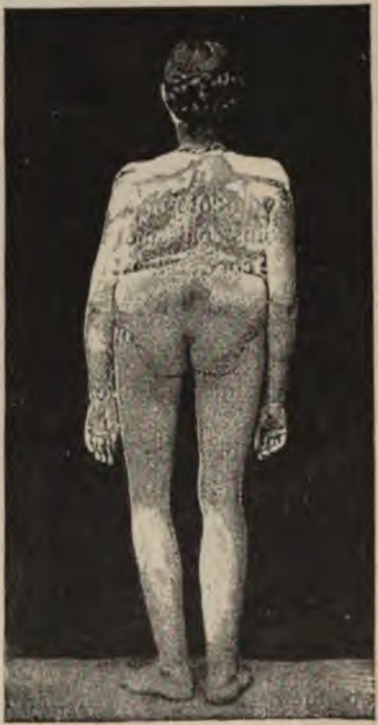


FIG. 86.—THE SAME, POSTERIOR VIEW.

d. *Pelvis with Congenital Separation of the Symphysis.*

Under the name "split pelvis" (*bassin fendu*) Litzmann describes a pelvis in which, as the result of arrested development, the two halves of the symphysis have never been united. (Figs. 87 and 88.) As this condition is nearly always associated with congenital cleft of the abdominal wall and *Ectopion vesicæ*, it possesses no obstetric interest. This pelvis is characterized by increase in the transverse measurements in consequence

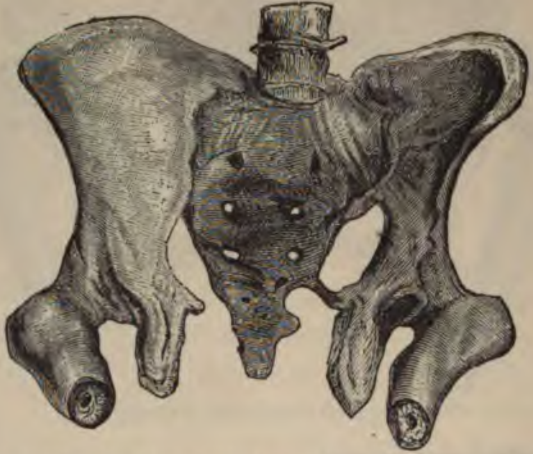


FIG. 87—PELVIS WITH CONGENITAL CLEFT AT THE SYMPHYSIS. (*Litzmann.*)

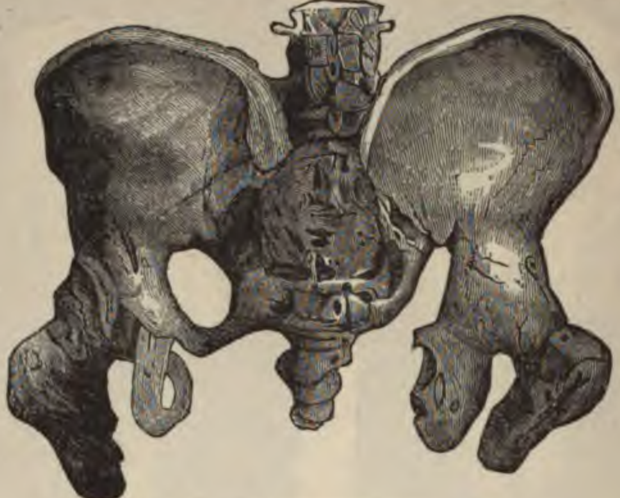


FIG. 88.—THE SAME SEEN POSTERIORLY.

of the sacrum being forced between the iliac bones, so that the latter are curved in such a way as to be nearly parallel. The pelvis is closed anteriorly only by fibrous tissue.

e. *Pelvis obstructed by Morbid Growths.*

The tumors may be osseous (exostoses), cancerous, sarcomatous, etc., which spring from the pelvic bones, or even from the adjacent organs.

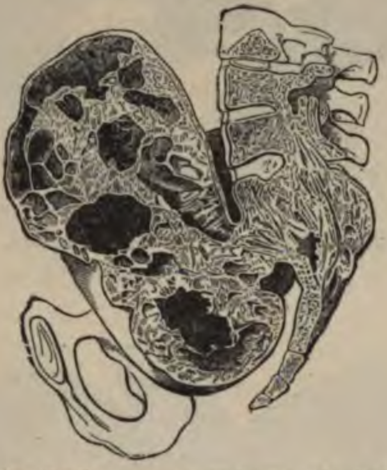


FIG. 89.—EXOSTOSIS OF THE PELVIS. (*Leydig.*)

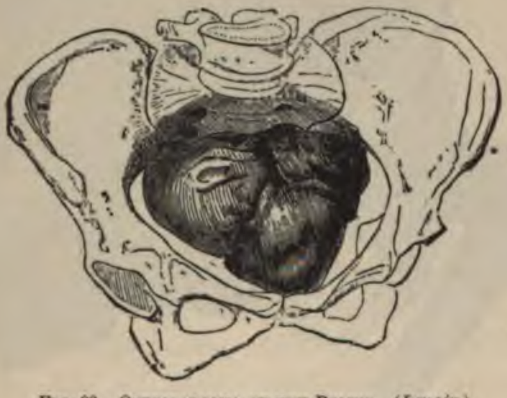


FIG. 90.—OSTEOSARCOMA OF THE PELVIS. (*Lenoir.*)

Figs. 89, 90, 91 and 92 represent cases of exostosis, of osteosarcomata, of fractures, etc., and give sufficient idea of the gravity of these deformities.

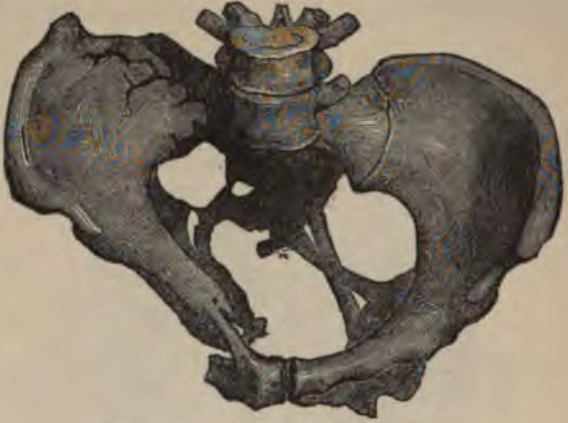


FIG. 91.—PELVIS DEFORMED BY COMPRESSION.

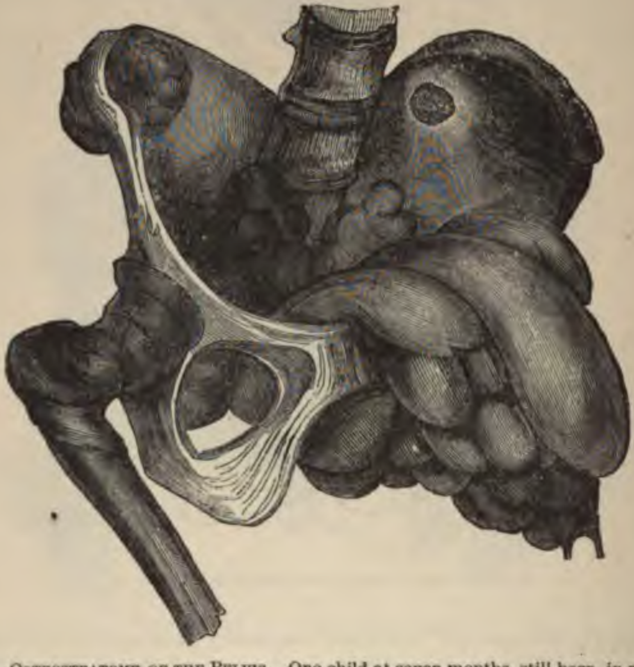


FIG. 92.—OSTEOSTEATOME OF THE PELVIS. One child at seven months, still-born, in a N-Para.

DIAGNOSIS OF PELVIC DEFORMITY.—MEASUREMENTS OF THE PELVIS.—PELVIMETRY.—PELVIGRAPHY.

The signs by which we may recognize pelvic deformity are of two kinds: Signs of probability; signs of certainty.

Signs of Probability.—Deformities of the pelvis are due, as we have seen, with the exception of certain cases of congenital deformity, to either general diseases, rickets, osteomalacia, or to local affections of the vertebral column, of the pelvis, or else, finally, to lesions of the inferior extremities.

Ordinarily, the history of the patient will give us a clue to the causal factor of the deformity, especially in case of rickets. A study of the writings of the older authors proves that they were familiar with this fact, and that they laid great stress on external examination of the patients. The external configuration, stature and symmetry of the patients, should, above all, attract our attention. It is usually women of small stature who present pelvic deformity, although, as we have seen, women of normal stature may also possess deformed pelves. In them, it is ordinarily from the history of antecedent labors that we obtain data pointing to pelvic deformity.

The form of the body calls for special attention. Women with broad hips and straight limbs rarely present pelvic deformity. Those of the reverse appearance are usually vitiated in the pelvis. Our suspicion of deformity will be the stronger in cases where the limbs are curved or shortened, or the spinal column is deviated.

Rickets is the most common cause of pelvic deformity. It developes in the first years of infancy, and interferes with normal growth. We must inquire, therefore, into the age when the women began to walk, and if walking has been difficult. At times walking was not attempted till the age of three to four, and again the women simply remember that walking was difficult, or that cod-liver oil was given them in infancy.

Rickets is an affection characterized by the fact that its march is progressive from below upwards. More or less pronounced deformities of the lower limbs will be found, as also of the vertebral column, but the pelvic deformity is not at all always proportionate to that of the limbs. Although, in general, deformity of the lower limbs and of the pelvis march hand in hand, this is not the invariable rule. Women with pronounced pelvic deformity may offer but little change in the limbs, and *vice versa*. These are the cases which are apt to deceive the accoucheur, and are unfortunate for the women in that no suspicion is evoked as to the gravity of the deformity until labor has set in. Hohl's theory, therefore, which deduces the shape of the pelvis from the degree of deformity of the extremities, is a fallible one. The same holds true of Weber's theory, which supposes an accordance between the form and volume of the skull and the capacity of the pelvis.

As for deviations of the vertebral column, the age at which they occurred is of great importance. If they date from infancy, they are due to rickets, and then the woman is usually small, the limbs short and slender, enlarged at their extremities, the thorax shows the characteristic chaplet, the head is large, the forehead and chin projecting. There has been, in a word, a true arrest of development. If, on the other hand, the spinal deviation is of later date, the changes are local. It is scoliosis, lordosis, kyphosis of the spine which are in the foreground. The limbs appear longer the more the thorax is diminished. The upper limbs reach the knees or lower, the legs are straight. Often then the pelvis is but little altered, but still such women should be carefully examined in regard to pelvic capacity. (See the sections on lordosis, scoliosis, kyphosis.)

In women who limp, whether this results from disease or from shortening of one or other femur, there is almost always associated pelvic deformity. We should always, hence, question the woman in regard to the cause of her limp.

As a general rule, whatever the appearance or health of the woman, the pelvis should be examined with care.

Palpation, at the seventh month, will ordinarily allow us, in primiparæ, to judge as to the engagement of the fœtal head. If engagement has not occurred, then should the pelvis be examined with care. In multiparæ we possess the data furnished by previous deliveries. We know that deformity of the inferior strait and of the cavity is usually due to kyphosis. The deviation of the spine, therefore, will arouse our suspicions.

Signs of Certainty.—These are obtained from direct examination of the pelvis. The following are, according to Cazeaux, the normal dimensions of the pelvis.

		Inches.
Superior strait	Antero-posterior	4.29
	Oblique	4.87
	Transverse	5.27
Excavation.—All the diameters, about, ...		4.68
Inferior strait " " (mean)		4.29
From ant. and inf. iliac spine of one side, to opposite,		8.39
From ant. and sup. " " "		9.36
From centre iliac crest " " "		10.5
" " " to tuberosity of ischium, .		3.51
From ant. and sup. part of pubic symph. to summit of first spine of sacrum (from which deduct thickness of sacrum and of symph.)		7.05
From isch. tuberosity of one side to post. sup. iliac spine of other, ...		6.8
From ant. sup. spine, one side, to post. sup. spine of other (mean), ...		8.19
From spine of 2d. lumbar vertebra to ant. sup. iliac spine of one or other side (mean), ...		6.8
From great trochanter, one side, to post. sup. iliac spine of other, ...		9.75
From centre inferior border of symph. to post. iliac spine of one or other side, ...		6.6

Instrumental Pelvimetry.

Pelvimetry may be external, or internal. The number of instruments is great. In 1856, Killian, in his *Armamentarium Lucinæ*, described 20, and this number has greatly increased. The oldest instruments are those of Stein, 1770, and of Baudelocque, 1781. We mention simply the principal ones. For the description of each the curious reader is referred to Lenoir's monograph.

Of external pelvimeters, we mention, Baudelocque's and Davis'; of internal, Stark's, Kurzwich's, Köppe's, Simon's, Asdrubali's, Wigand's, Weidmann's, Ritgen's, Osiander's, etc., etc.; of the combined, Boivin's, Beck's, Amant's, Lazarevitch's, Kiwisch's, Veit's, Hubert's, Budin's, etc., etc. We will describe simply the pelvimeters of Baudelocque, Van Huevel, Depaul, Budin, Hubert, Kuestner, Crouzat.

Baudelocque's Pelvimeter.—It consists of two metal rods curved into a half circle so as to embrace, in their concavity, the greater part of the pelvis. The ends of the rods are furnished with lentil-shaped buttons, for application to the ends of the line we wish to measure. A graduated bar is fitted at the junction of the straight and curved portion of the instrument, and thus the degree of separation of the extremities is measured.

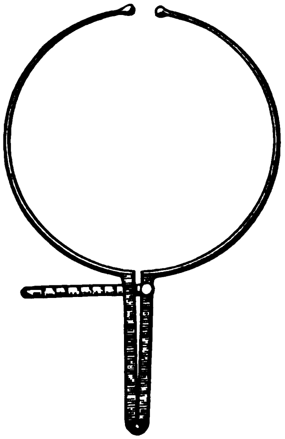


FIG. 93.—BAUDELOCQUE'S PELVIMETER.

Van Huevel's Pelvimeter.—Devised in 1841, modified in 1855, we describe it as completed. It is a compass in shape, composed of two blades; the one fixed, the other movable. The first is internal or vaginal, and is eleven inches long, flattened like a spatula at its end, furnished at the centre with a ring below; this a graduated circle, and it articulates below, like a compass, with the second blade. This, in turn, may be shortened or lengthened at will, by sliding downward or upwards. (See Fig. 94.) Its upper extremity is traversed by a screw. When in use, the internal blade rests, at its extremity, at the sacro-vertebral angle, for internal measurements, and for external the extremities of the blades are used even, as in Baudelocque's instrument. The essential part and advantage of the instrument is the fact that the external blade is movable upward or downward with ease, and therefore the measurements may be very exactly obtained. The extremity of the internal blade may further be placed on the inner border of the symphysis, or indeed at any internal point, the outer blade resting wherever we please, and thus we may obtain the

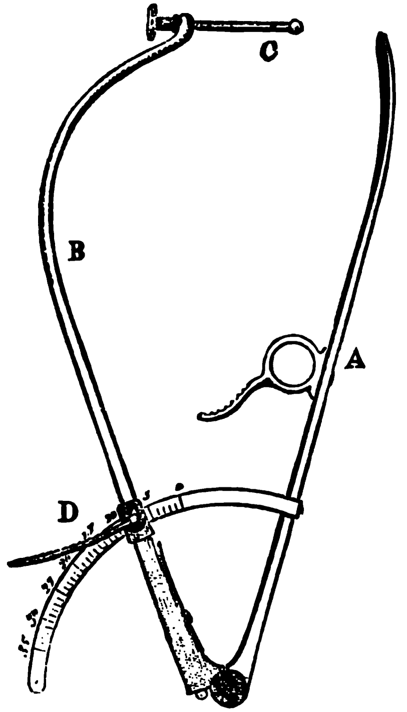


Fig. 94.—Universal Pelvimeter of Van Huevel. A, Vaginal blade. B, External blade, C, Horizontal screw. D, Arm of lever which compresses B at the graduated circle.

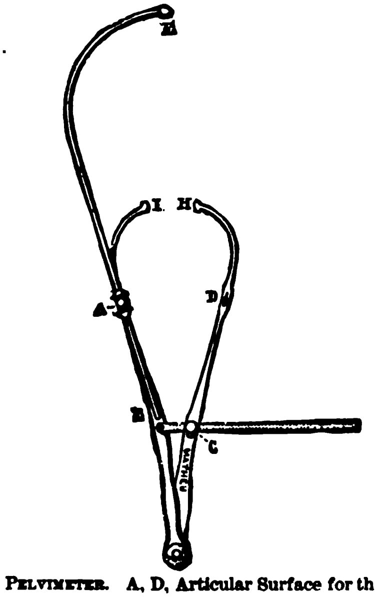


Fig. 95.—Depaul's Pelvimeter. A, D, Articular Surface for third blade. E, This blade.

thickness of the symphysis, or any one of the diameters with a considerable degree of accuracy.

Depaul's Pelvimeter.—This is simply Baudelocque's, modified so as to allow of its being used internally. The two blades of the instrument form, not a half circle, but a figure of eight, and further they may cross one another. (Fig. 95.) A supplementary movable blade allows of measuring the height of the uterus, one of the shorter blades resting on the cervix.

Budin's Cephalometer. (Fig. 96.)—In principle it is simply Depaul's pelvimeter enlarged. It is 17.7 inches long; the two blades may be opposed and slide on one another, each being 9.75 inches long. One blade holds a graduated circle, the other terminates in an index. When the two extremities are in contact, the index points to 0, and as they separate this index marks the degree.

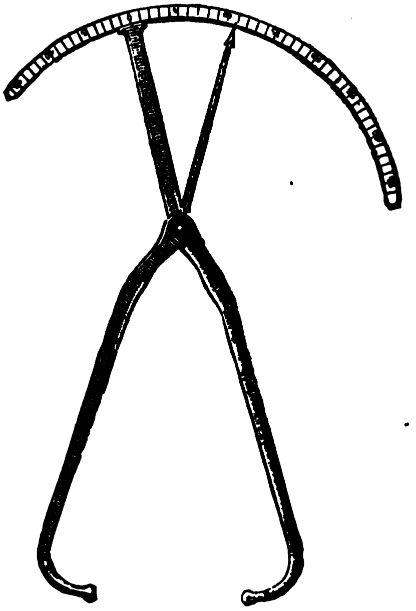


FIG. 96.—BUDIN'S CEPHALOMETER.

Hubert's Pelvimeter. (Fig. 97.)—In shape like a widely open V, the long external blade is 6.5 inches long, and curved at its lower extremity, at an angle of 45°, to join the second blade, which terminates in a spatula, 2 inches long, and 1 broad. To complete the instrument, take a piece of letter paper, and fold it 7 to 8 times on itself, and cut it to a point. (Figs. 98, 99.)

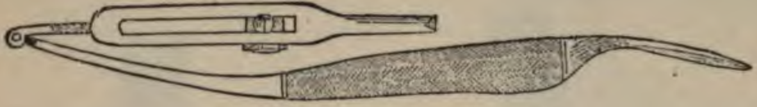
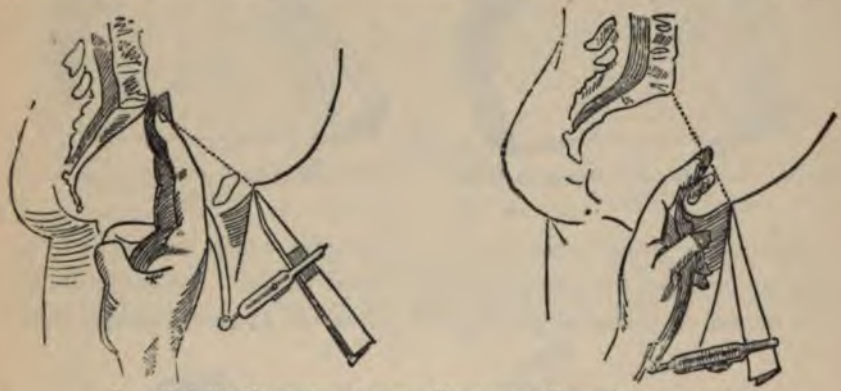


FIG. 97.—HUBERT'S PELVIMETER.

Method of Using.—The highest point of the external surface of the pubes is marked. The vaginal blade is then guided to the sacral promontory by the finger; the point of the paper is placed at the mark on the pubes, and the other end passed through and held in the second blade.



FIGS. 98 & 99.—MEASUREMENT OF THE PELVIS WITH HUBERT'S INSTRUMENT.

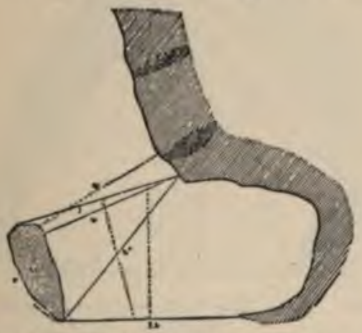


FIG. 100.—OSTEOMALACIC PELVIS. Slight degree. (*Pinard.*)

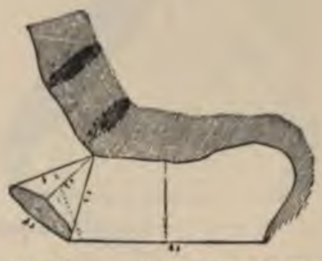


FIG. 101.—RACHITIC PELVIS, WITH LOWERING OF PROMONTORY. (*Pinard.*)

To withdraw the instrument, it is tilted forwards, and the space which separates the point of the paper from the top of the spatula, is the sacro-pubic interval, and to obtain this diameter we have simply to deduct the thickness of the pubes, and this may obviously readily be obtained by the instrument.

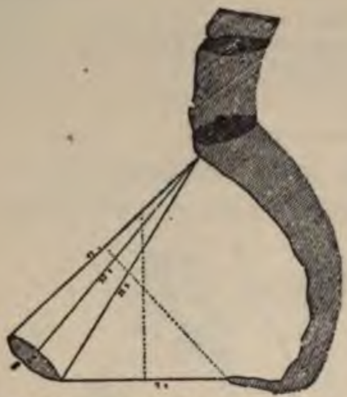


FIG. 102.—UNILATERAL LUXATION OF LEFT SIDE. (*Pinard.*)

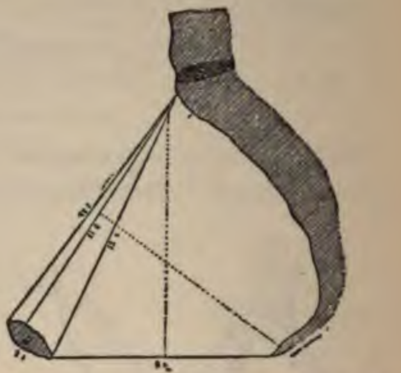


FIG. 103.—CONGENITAL LUXATION OF THE FEMURS. (*Pinard.*)

Pinard has joined to pelvimetry, pelvigraphy, which enables us to reproduce on paper the measurements of dried pelves. According to him, "in normal as well as in pathological pelves, the shortest diameter is that which extends from the promontory to a point situated .1 to .2 inches above the upper border of the symphysis, or a little higher, and not the sacro-pubic distance as is generally admitted in France. This diameter

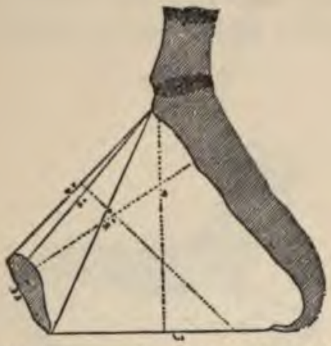


FIG. 104.—RACHITIC PELVIS, DORSO-LUMBAR KYPHOSIS. (*Pinard.*)

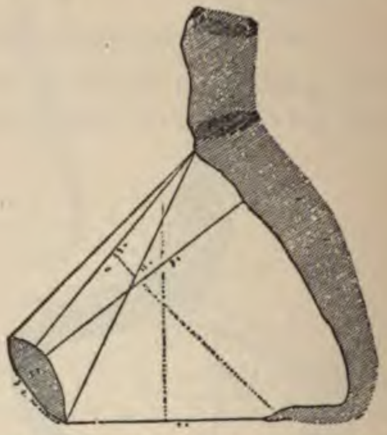


FIG. 105.—RACHITIC PELVIS. DORSAL KYPHOSIS. (*Pinard.*)

he calls the minimum or useful diameter. To attain his aim, Pinard uses two metallic blades, very supple, and yet capable of retaining the curve given to them. They are .39 inches broad, and .039 inches thick. They suffice to obtain the contour of the posterior wall of the pelvis, from the tip of the coccyx to the last lumbar vertebra, and also the imprint of the anterior and posterior surfaces of the pubes. By tracing the shapes thus

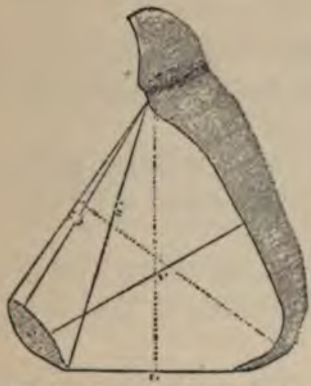


FIG. 106.—NON-RACHITIC SCOLIOSIS. (*Pinard.*)

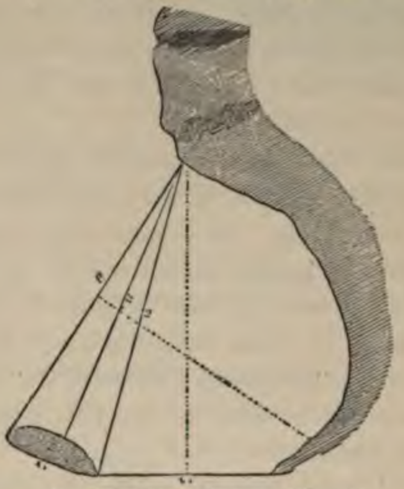


FIG. 107.—FUNNEL PELVIS. (*Pinard.*)

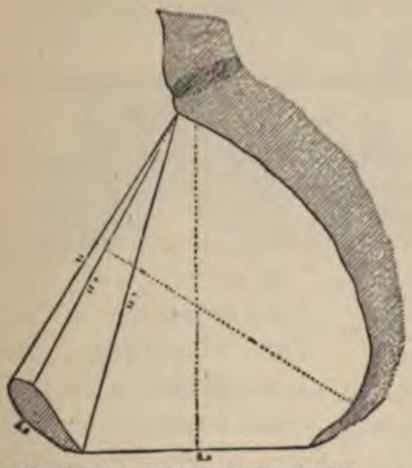


FIG. 108.—KYPHO-SCOLIOSIS OF DORSAL REGION. (*Pinard.*)

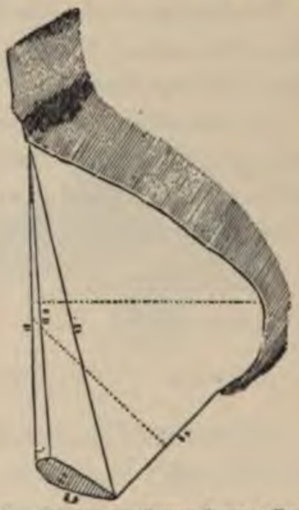


FIG. 109.—KYPHOSIS OF DORSO-LUMBAR REGION. Anchylosis to right angle of right hip. (*Pinard.*)

given to the blades on paper, if we have also by the compass taken the position of the sacrum and the pubes, we obtain graphic outlines, representing the natural size of an antero-posterior section of the pelvis that is to say, giving both the sacro-sub-pubic, and the least diameter of the pelvis. The figures 100 to 109 represent a certain number of outlines thus obtained."

Scheffer, from measurements on dried pelves, draws the following conclusions in regard to the dimensions of the transverse diameter of the superior strait. His measurements concern 252 pelves:

1. The greater the distance of the iliac crests, the greater the necessary deduction in order to obtain the transverse diameter of the superior strait. The mean difference is 5.07 inches.

2. The greater the distance of the iliac spines, the greater must be the deduction in order to obtain the transverse diameter of superior strait. The mean is about 4.70 inches.

3. In non-flattened pelves, the distance between the iliac crests furnishes more precise information than that between the iliac spines.

4. In flattened pelves, the distances between crests and spines are of about equal value.

5. To obtain the transverse diameter, we must deduct from the distance between the crests 5.2 inches, in the dried not flattened pelvis, and 4.5 inches in the flattened.

6. The deduction from distance between iliac spines is about the same in both pelves, about 4.7 inches.

Dohrn reminds us that if we consider as contracted pelves those where the conjugata vera is less than 3.6 inches, then:

Michaelis found	13.1 per cent. at Kiel.
Litzmann "	14.9
Schwartz "	20.3 at Marburg 22 " Göttingen.
Spiegelberg "	13.9 at Breslau.
Schroeder "	14.6 " Bonn.

With all authorities, Dohrn prefers digital mensuration, with two fingers, over all pelvimeters. On the living, to find the true conjugate, 4 inches is to be deducted from the external, in the normal pelvis; 3.8 inches, in the uniformly contracted pelvis; 4 inches in the flattened pelvis.

Litzmann usually measures only the external conjugate and the transverse. But, while Baudelocque deducted 3.12 inches in thin women, and 3.32 in fat, Litzmann, in 30 cases, found a mean difference of 3.71 between the internal and external conjugates, and he concludes that whenever the external conjugate, in the living, is less than 6.25 inches, there is contraction in the conjugata vera; and that with an external conjugate of 7.05 inches, contraction will exist in 50 per cent.; between 7.05 inches and 8.39 inches, scarcely in 10 per cent.; above 8.39 inches, almost never.

As for the transverse diameters, he found in 200 women with large pelvis, distance between crests, 11.5 in.; in 200 women with large pelvis, distance between spines, 10.5 inches.

The difference between the dried and living pelvis is about .4 inches.

As for the oblique diameters, he could draw no exact conclusions.

Küstner's Pelvimeter. (Fig. 110 and 111.)—This instrument is at the same time a kaligraph. It is composed of a solid plane curved in a half-circle to rest on the iliac crests. It is furnished with a metallic half-circle divided into two portions of 90° each, the zero being at the centre. On this half-circle is fixed the arc of a circle (three-quarters) also divided into degrees. The half-circle is fixed, the three-quarter is movable around a vertical axis (*a.*) Around the half-circle moves a lever (*d*), furnished with an index (See Fig. 110) which registers the divisions of the three-

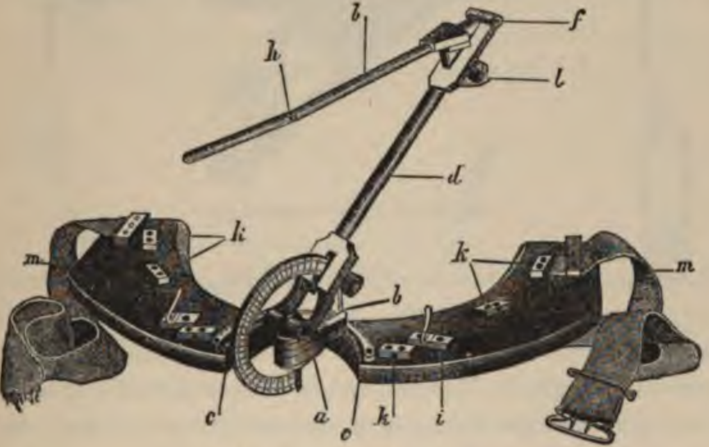


Fig. 110.—Kustner's Pelvimeter.

quarter circle. The lever is divided into two portions, between which is a circle of 90°. The free lever bar (*g*) is hinged at *h* so that it may bend at an angle of 60°. On the plane are two hooks, *i*, to which rubber bands may be attached, and at the two ends are two silk bands. Figure 110 represents the apparatus ½ reduced.

To apply the apparatus, the woman lies on her back, the thighs flexed, and abducted, the knees flexed. The plane is placed so that it rests at its extremities on the anterior superior iliac spines, its centre being over the symphysis. (Fig. 111.) The two rubber bands, passing behind the pelvis at the level of the crests, and tied together, hold the apparatus symmetrically in place. The free end of the pelvimeter is then inserted into the vagina and placed on one of the bony prominences which we desire to compare with the other, and then we read off the angles registered by the three circles. To find the point of the symphysis nearest the promontory, the free arm of the lever is bent to 60°, and then we may touch this point with the lever. We may thus obtain the extreme points in the pelvis, and from these the distances are calculated. (For the method, the curious reader is referred to Küstner's description.)

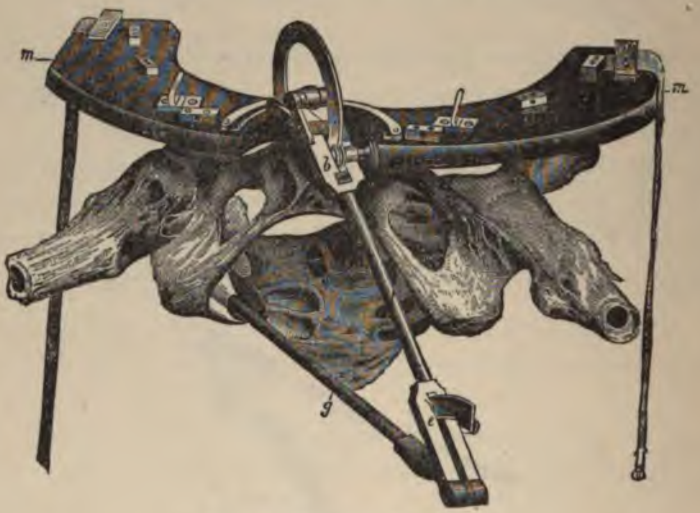


FIG. 111.—KUSTNER'S PELVIMETER.

Küstner insists on the simplicity of this method. We are sorry we cannot agree with him.

Crouzat's Pelvimeter.—In 1881, Crouzat proved that digital mensuration was open to serious error, that is to say, in the estimation of the least sacro-pubic diameter there might be an error of 1.5 to 2 inches in two cases out of three. To remedy this possibility he devised an instrument to be used as a direct pelvimeter. It is composed of two portions, a blade, and a graduator. (Figs. 112, 113, 114, 115.)

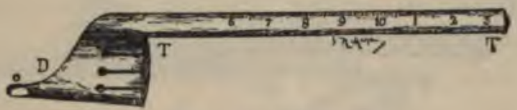


Fig. 112.—Crouzat's Pelvimeter.

The blade is of steel, round, 8 inches long, including the finger holder, and .2 inches thick. The nail rests at 0. The blade is graduated in hundredths of an inch, the zero being at 0. The graduator (CC′) (Fig. 113) is 3.9 inches long, and at each end is a graduated arc of a circle. The larger arc (*A*) measures 1.5 inches in height, and the smaller (*a*) 1.1 inches. The one or the other is used according to the elevation of the post-pubic point. The curvature of the two arcs is the same, belonging to an arc of a circle of 3.12 inches in diameter. In figure 114 it is seen that the arc is hollowed out in its centre to diminish the contact surface. On the horizontal rod of the graduator is the slide (G) 1 inch long. This may be placed at one or another end, and fixed there at *i*.

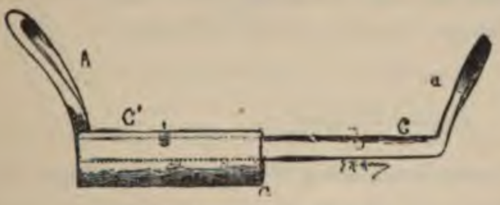


Fig. 113.—Crouzat's Pelvimeter.

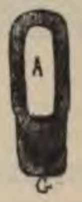


Fig. 114.—Front View of Arc.

Use of Instrument.—The bladder and rectum having been emptied, the woman is placed in the obstetrical position, the buttocks elevated, the thighs separated, the feet resting on two chairs. The operator stands between the patient's legs, and makes a careful vaginal examination, in order to locate the promontory, and to find the situation of the post-pubic point. According to the height of this point, he choses the smaller or larger arc. The right index is then inserted into the holder, and is carried into the vagina to the promontory, the chosen arc being, at the same time, carefully placed behind the symphysis. The graduated distance is then read off the horizontal bar, and this is the exact measurement of the least promonto-pubic diameter, inclusive of the soft parts.

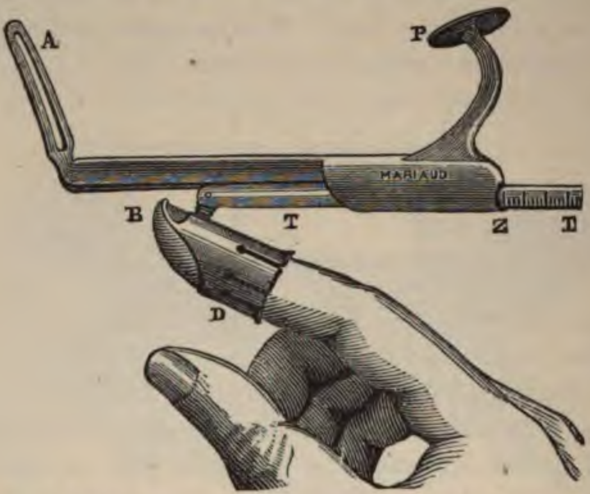


FIG. 115.—MEASUREMENT OF PELVIS BY MEANS OF CROUZAT'S PELVIMETER.

Digital Pelvimetry.

As Depaul well says, "notwithstanding the partial advantages offered by the pelvimeters, they one and all are open to objections which render them useless in routine practice. Of all the methods of measurement, that by the hand is certainly the least uncertain, inconvenient, and most exact in its results. We may thus measure the conjugate, and appreciate with sufficient exactness the length of the transverse and of the oblique diameters of the superior strait. All the more readily, of course, in the cavity, and at the inferior strait. Further, thus exostoses and tumors may be readily recognized. This is the method of mensuration almost entirely used in France, and abroad the tendency is to return to it. We certainly do not thus attain mathematical results, but the expert obtains figures precise enough for practical purposes."

While in Germany the left hand and two fingers are used for mensuration, in France the right and one finger are resorted to; only in exceptional cases is it customary to use two or more fingers, or the entire hand.

The woman should occupy the dorsal position, the nates resting on a pillow. The index is carried upwards and backwards to the sacro-vertebral angle, which is readily recognized by its projection, and the transverse depression at the sacro-lumbar articulation. (Fig. 116.) We must not confound with the promontory, the projection which the first sacral bone sometimes makes over the second, and to avoid this the finger should be carried as high as possible. The promontory once found, the end of the index is placed upon it, and the wrist is lifted upwards, until it rests under the inferior margin of the symphysis. The index of the other hand is then placed against the first, just under the symphysis. The vaginal finger is then removed, with the other in place against it, and then the distance from the point of the index to the position of the second finger may be measured, and we have the exact sacro-sub-pubic diameter.

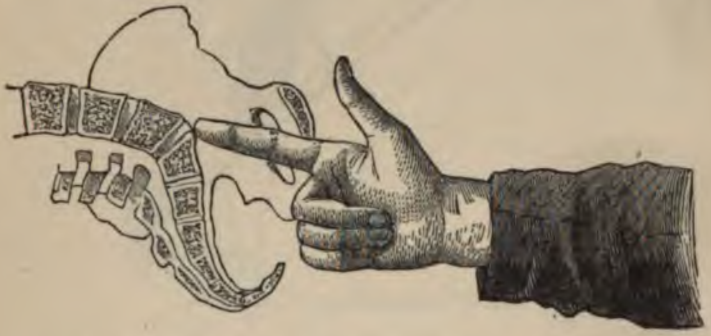


FIG. 116.—MEASUREMENT OF THE CONJUGATE WITH THE FINGER.

Often, to reach the promontory, it is necessary to depress the elbow as much as possible and to elevate the nates excessively.

Now the diameter we have thus obtained, is not the sacro-pubic, but the sacro-sub-pubic, that is to say, an oblique line longer than the antero-posterior diameter, and we must hence deduct a trifle, according to the depth, and the obliquity of the symphysis, in order to obtain the true diameter. (See Figs. 117 and 118.) Authorities do not agree as to the amount which should be deducted, varying from .2 to .6 of an inch, according to the pelvis.

From his measurements Pinard concludes that: Although the height, thickness, and direction of the symphysis are the true causes of variation in the diameters, it is especially the height which is important, and then the direction, and finally the thickness; and he shows that, whenever the symphysis measures 1.5 inches and above, we must deduct from .3 of an inch to .7; and whenever it measures less, it will suffice to deduct about .4 of an inch. He agrees, therefore, with Depaul.

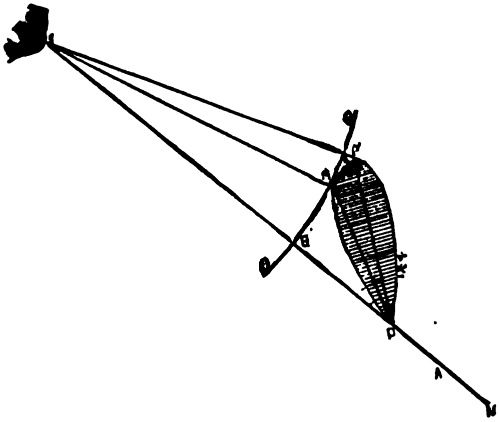


FIG. 117.—MEASUREMENT OF THE PELVIS.

Whenever the finger cannot reach the promontory, the presumption is allowable that labor may take place at term, although it does not necessarily follow that the pelvis is normal, as, for instance, in the oblique oval pelvis, where we cannot reach the promontory, and yet the pelvis is far from being normal.

As for pelvimetry at the inferior strait, Breisky prefers external mensuration. We suggest, on the contrary, the following method:

The woman is placed in the knee-elbow position, and an assistant pulls aside the skin of the nates, until the vulva opens. The internal border of each tuberosity is then found, and marked in ink. The distance between the two points is now measured, and we possess the external transverse diameter.

The finger is then inserted into the vagina to the internal border of the tuberosity of the ischium, and one of the blades of Depaul's pelvimeter is placed against it, and the other blade against the corresponding point on the other tuberosity. Reading off the distance on the scale, and comparing the figure with that obtained above, we have the bi-ischiatic, or internal transverse diameter.

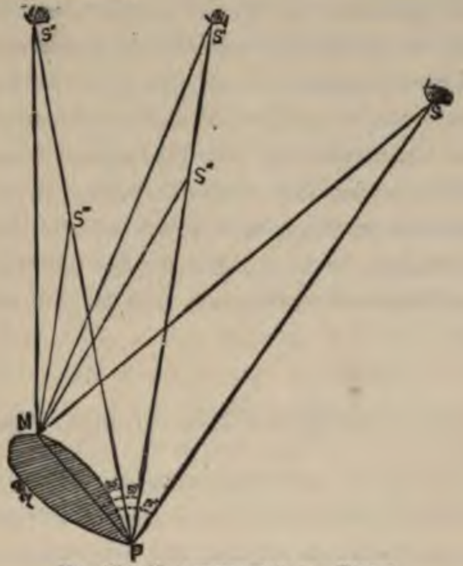


FIG. 118.—MEASUREMENT OF THE PELVIS.

We thus obtain, approximately it is true, but with sufficient accuracy, the dimensions of the transverse diameter.

The methods of external mensuration in use, give exact enough figures, practically, for the transverse diameters of the inferior strait, as is proved by Frankenhauser's figures. His measurements were made with Osiander's instrument, and in 9 cases the following were the results:

	During Life.	After Death.
1 case,	4.3 inches	4.3 inches.
2 cases,	4.3 "	4.1 "
3 "	3.8 "	3.7 "
4 "	4.2 "	4.2 "
5 "	4.9 "	4.7 "
6 "	3.7 "	3.7 "
7 "	3.3 "	3.3 "
8 "	3.9 "	4. "
9 "	3.7 "	3.7 "

We see that the differences are slight.

Stocker lays great stress on the value of the measurement of the bi-ischial diameter, both from the standpoint of diagnosis, and of prognosis. He says: "1. Increase in the bi-ischiatic diameter indicates either a rachitic pelvis, or else deformity due to double femoral luxation. 2. A bi-ischiatic diameter of less than 3.5 inches indicates, very nearly, a funnel-shaped pelvis, and these are, usually, also diminished at the superior strait. 3. Diminution of the bi-ischiatic diameter in a rachitic pelvis, means a general and regular contraction. 4. If in a pelvis we find both diminution in the antero-posterior, and the bis-ischiatic diameters, osteomalacia is suggested. 5. Exaggeration of the bis-ischiatic diameter suggests a diminution in the transverse of the superior strait. From a therapeutical standpoint, diminution in the inferior strait, exposes to laceration of the perineum, often renders recourse to the forceps necessary, gives the infant little chance in case of version, and calls for the early induction of premature labor.

Diagnosis of the different Forms of Pelvic Deformity.

A. *Pelvis regularly and generally Contracted.*—We notice, at the outset, the slight forward projection of the sacrum. Mensuration enables us to determine a more or less regular and proportionate diminution in the external diameters, and in the general circumference of the pelvis. The external conjugate is least diminished, and the distance between the anterior iliac spines in the most, resulting in a greater difference between these and the crests than normally. Internal mensuration almost always gives a moderate diminution is the sacro-sub-pubic diameter (the diagonal conjugate.) We must usually deduct to obtain the true conjugate from .3 to .5 of an inch. The cause of this disproportion between the two conjugates is above all due to the lessened inclination of the symphysis.

B. *Flattened Pelvis.*— Is characterized, in particular, by diminution in the antero-posterior diameter of the inlet, the other diameters suffering but little change.

a. *Flattened, not Rachitic Pelves.*—This variety, according to German writers, is the most frequent of all, 35 to 25 in 100. The general configuration and the bones of such women are frail. The sacrum is usually deeply placed between the iliac bones, projecting forwards, and the posterior iliac spines jut out considerably beyond the sacrum. The inclination of the sacrum, however, seems less, perhaps, than normal. External mensuration gives figures a little below the normal. The external conjugate is the most diminished, while the transverse are but little altered. The distance between the anterior and the posterior iliac spines is diminished. The deduction to obtain the true conjugate is about the same as in the normal pelvis. This diameter is usually over three inches, and rarely below. Sometimes there exists a double promontory.

b. *Flattened, Rachitic Pelvis.*—All the diameters are lessened, particularly the antero-posterior. This is the most frequent of all pelves. The diagnosis is easy. The hips are narrow, the distance between the crests and the spines is diminished. The sacrum has the rachitic shape, the anterior and posterior spines are near together, the external conjugate is notably diminished. The inclination of the symphysis is great, and therefore great deduction must be made to obtain the true conjugate.

C. *Oblique, Oval Pelvis.*—The diagnosis has only exceptionally been made on the living. Its presence may be suspected by the greater elevation of one of the iliac crests, by the inequality of the distance between the anterior and posterior iliac spines and the spinous process of the last lumbar vertebra. The posterior iliac spine is on the anchylosed side nearest the median line. The symphysis is found to be directed towards one of the sides, the ischiatic spines are at about the same distance from the sacrum, and one of the sacro-cotyloid diameters is shorter than its fellow. According to Naegelé, the following measurements are obtained by Baudelocque's pelvimeter:

	Inches.
From the isch. tuberosity one side to the post. ant. spine of the other, mean distance	6.8
From the ant. sup. spine of one side to the post. sup. spine of the other, ...	8.19
From the spinous process of the last lumbar vertebra, to the ant. sup. spine of both sides, ...	7.02
From the trochanter of one side, to the post. sup. spine of the other, ...	8.58
From the centre of the inferior border of the symphysis to the post. sup. spine of each side, ...	6.8

The prognosis is very grave. Litzmann, found that of 28 women, 22 died at first confinement, 5 at the second, and 1 at the sixth. Of 41 deliveries only 6 were normal, and of these 6, 5 were in the same woman. Of 41 children, only 10 were born alive, 6 from the same woman, and 2 by the Cesarean section. Schroeder, however, in 3 cases, notes all the mothers and children living.

Thomas lays down the following corollaries: "A. We must always think of the oval pelvis when: 1. Some mechanical cause seems to interfere with labor, even though we cannot reach the promontory; 2. When the iliac crests are not on the same level; 3. When the two postero-superior iliac spines are at unequal distances from the sacral crests; 4. When the history tells us that in infancy there was disease of the pelvic bones. B. When we suspect an oblique narrowing of the pelvis, we must endeavor to reach a diagnosis by: 1. Palpating the horizontal pubic rami, and the internal lateral walls of the pelvis; 2. Measuring the posterior stheno-cords. (Ritgen.); 3. External measurements, which often alone suffice."

D. *Transversely contracted Pelvis.*—The diagnosis is easy, since there exists marked narrowing of the inferior strait. The parallelism of the pubic rami is striking, the narrowness of the symphysis, the nearness of the ischiatic tuberosities. External mensuration allows us to determine notable diminution in the following diameters:

1. Between the trochanters.
2. Between the two iliac crests.
3. Between the ant. sup. iliac spines.
4. Between the ischiatic tuberosities.

E. *Scoliotic, Kyphotic Pelvis.*—The deformity of the vertebral column will at once attract attention.

F. *Spondylolisthesic Pelvis.*—The history will reveal an injury after infancy. The attitude is often characteristic, owing to the forward inflection of the vertebral column. In Olshausen's case the woman walked like a quadruped; in Belloc's, the head and the upper part of the trunk were inclined forward to the level of the pelvis. The thorax is pushed backward, and the distance between it and the pelvis is notably diminished. Internal examination allows us to touch readily all the bony portions. Externally the spinal curve, with concavity backwards, is noticeable.

G. As for pelves deformed by luxations, shortening of the inferior limbs, the nature of the lesion is apparent. We may, however, be deceived.

We remember a case where there existed a congenital luxation of the right femur, and yet on vaginal examination very different characters were found. On close questioning we elicited the fact that, in childhood, the woman had suffered, in addition, from caries of the upper part of the sacrum and lower lumbar column.

H. The osteomalacic pelvis does not entail any difficulty in diagnosis. The progressive march of this disease; its beginning after repeated pregnancies, and the peculiar form of the deformity will put us on the right track.

PREGNANCY IN PELVIC DEFORMITY.

At the outset, we would recall the fact of the frequency of miscarriage and of premature labor, in case of pelvic deformity, owing to the mechanical interference with the development of the uterus and of the fœtus. When the uterus, in the course of its growth, endeavors to rise above the superior strait, it is evident how a projecting promontory will interfere, and how, furthermore, in case the uterus is a little tilted backwards, there will result retroversion, and, in case this displacement increases, we witness all the phenomena indicative of incarceration. (See Retroversion of the Uterus.) Happily, in the large proportion of cases, the uterus is able to pass by the obstacle, and to rise above the brim, and pregnancy may continue. What strikes us at once, in such cases, is the elevation of the fundus out of proportion to the age of the pregnancy, and, in addition, the lower segment of the uterus, and if, in the latter months, it can be reached, the fœtal parts are felt but indistinctly, if at all. This, obviously, is different from that which obtains in normal cases. Again, this elevation of the uterus is accompanied by greater mobility. The abdominal walls hang forwards, constituting the *venter propendulus*. The falling forward of the uterus is further favored by the inclination of the pelvis.

Pelvic deformities have a capital influence on the presentations and positions of the fœtus. The fact of the frequency of mal-presentations has been noted by all accoucheurs, from the time of Mauriceau, and this is explained by the difficulty the fœtus has in accommodating itself to the uterus and to the pelvis. The following data deduced from Litzmann, Spiegelberg, Schroeder and Stanesco, will give an approximative idea of the frequency of different presentations in pelvic deformity:

In 108 cases where spontaneous labor occurred	Vertex, . .	92
	Breech, . .	13
	Face, . . .	2
	Shoulder, .	1
In 47 cases where labor was ended by version	Shoulder, .	31
	Vertex, . .	11
In 108 " " " " forceps	Vertex, . .	102
	Face, . . .	5
	Breech, . .	1
In 16 " " " " craniotomy	Vertex, . .	13
	Breech, . .	2
	Face, . . .	1
In 46 cases premature labor was induced	Vertex, . .	34
	Breech, . .	8
	Shoulder, .	4
In 90 where cephalotripsy was requisite .	Vertex, . .	82
	Face, . . .	4
	Breech, . .	4
In 4 Cæsarean sections	Vertex, . .	2
	Not stated .	2

In 414 cases, then:

Vertex, ...	336
Face, ... - . . .	12
Breech, ...	28
Shoulder, ...	36
Not stated, ...	2

Rigaud in 396 cases, with 404 children, gives the following figures

Presentations of vertex	O.L.A., .	352
	O.R.P., . .	100
	O.R.A., . .	6
	O.L.P., . .	2

The position O.L.A. includes the cases where the presentation was noted and the position not.

Breech cases, ...	29
Face, ...	4
Shoulder, ...	11

Considering together the statistics of Rigaud and of Stanesco:

	Infants.
Presentations of vertex, ...	696
" " Face, ...	17
" " Breech, ...	67
" " Shoulder, ... , .	47
Unknown, ...	2
Total,	829

It is evident, then, that presentations of the face, and of the shoulder are much more frequent in case of pelvic deformity than in normal pelves.

Spiegelberg and Schroeder have further noted that changes in presentation, both in pregnancy and at the beginning of labor, are very frequent. These changes may be explained by the greater motility of the fœtus. Litzmann, Hecker, Credé, Schultze, all agree on this point. These mutations are infrequent in primiparæ, since in them the uterus tends to retain its ovoid shape. They are met with, on the other hand, very frequently in multiparæ, owing to the laxity and diminished resistance of the uterine and abdominal walls.

It is particularly in premature labors that mal-presentations are met with. All authorities agree in the frequency with which there occurs prolapse of the limbs and of the cord. According to Spiegelberg, this frequency is 4 to 5 times greater than under normal conditions.

In the cases collected by Rigaud and Stanesco, 810 in all, there was noted:

Prolapse of cord alone,	71
" " " and limb,	3
" " arm,	13
" " foot,	2
" " " and hand,	1

that is to say, 90 cases of prolapse in 810 cases, or 11.11 per cent.

Aside from these local phenomena, women with pelvic deformity present certain general characteristics.

When there exist coincidently spinal curvature and alteration of the thorax, there often result respiratory and circulatory troubles, as evidenced by edema of the lower limbs, dyspnœa, gravido-cardiac disorders, pulmonary congestion, eclampsia, and these complications may of themselves induce labor, even if they do not call for the induction. Usually, however, the general disturbances resulting from pelvic deformity are relatively well borne, and without disturbing pregnancy very much, which usually goes to term; it is generally only at labor that serious complications supervene. Every variety of deformity, however, as we will see, does not portend the same gravity.

LABOR IN CASE OF PELVIC DEFORMITY.

At first we will study the general course of labor, and afterwards the march in special varieties of pelvic deformity.

The phenomena of labor are divided, even as in normal cases, into physiological and mechanical.

For the purposes of our study, we will divide pelvic deformity, with Naegelé and Grenser, into three great classes:

1. Although the pelvis is contracted, it allows of expulsion of the fœtus by the efforts of nature. The risk to both mother and infant is, however, increased.
2. The contraction does not prevent engagement of the head at the superior strait, or in the cavity, but the head cannot entirely pass.
3. The contraction is of such a degree that the head cannot enter the superior strait, and remains movable above it.

In pelvic contraction, aside from the factors requisite in normal labor, regular and good contractions, there are two on which great stress must be laid: The degree of contraction, and the reducibility of the fœtal head.

Physiological Phenomena.

a. *Uterine Contractions.*—In general, it may be said that these are proportionate to the resistance to be overcome. At first they are normal and regular, but it is not rare to see them assume an extreme intensity, yielding soon to feebleness and irregularity, merging finally into uterine inertia. These irregularities, of course, are most marked where the contraction is considerable, and labor of long duration.

The obstacle once overcome, not infrequently labor is speedily finished; in other cases, however, the uterus, tired out by its efforts, sinks into complete inertia. Whatever the case, both too energetic and too feeble contractions are fraught with danger. If they are too energetic, rupture of the uterus may result; if they are too feeble, the head does not engage, and labor is prolonged to the detriment of both the mother and the child.

Whatever the nature of the contractions, what strikes us particularly is the tardiness with which the head engages, a tardiness dependent not alone on the contraction, but on the overhanging abdomen, whence the head does not correspond to the pelvic inlet. This engagement of the head is exceptional before labor, in case of deformed pelvis. Litzmann in 222 women, found it only partially engaged 18 times during pregnancy; during labor in only about 24.1 per cent. of the cases; in 56 per cent. engagement only occurred after complete dilatation of the cervix. Vaginal touch, therefore, at the beginning of labor, does not allow us to reach the presenting part, which remains above the superior strait. Only by forcibly depressing from above, can the finger touch a small segment of the vertex.

b. *Dilatation of the Cervix.*—This occurs slowly, often very slowly, on the one hand on account of the little intensity of the contractions, and on the other because the membranes usually rupture prematurely, and, therefore, mechanical pressure is largely absent. As long as the membranes are intact dilatation proceeds regularly enough, but when these rupture, the cervix thickens and dilates very slowly. The cervix itself presents certain peculiar characteristics. Instead of being thin, as normally is the case, it remains thick; the os rarely exceeds in dilatation the size of a quarter, but we find that it is perfectly dilatable. This happens because the head has not pressed on the cervix, but has remained above the superior strait. Under the influence of the contractions, however, the head becomes more and more moulded and becomes partially pointed, and engages a trifle. At this part of the head the caput succedaneum forms, and projects the more the longer the duration of labor. The cervix is filled with this herniated, as it were, caput, and the cervix forms a ring around it, even where the head remains above, or nearly so, the superior strait.

c. *Membranes.*—The head being retained above the superior strait, the liquor amnii may collect in front of it, and therefore the bag of waters is always voluminous. If the resistance of the membranes is considerable, it is an efficient factor in dilatation, until they rupture, and this usually happens before the os is more than one-sixth dilated. It is at the moment of rupture, especially if the woman is in the erect position, that prolapse of the limb or the cord occurs, the presence of which, above the superior strait, we may occasionally recognize before rupture. When, however, the membranes are elastic, the appearance and sensation is different. The bag of waters does not form within the cervical canal, but outside, and the projection is the more the greater the elasticity of the membranes. On touch, at first sight, it seems as though dilatation were completed, but on carrying the finger higher, the constricting cervix is felt.

In each instance, however, the membranes rupture prematurely, and before dilatation has occurred, and, in consequence, labor is prolonged, and the fœtus is exposed to the dangers resulting from interference with the uterine and placental circulations.

Occasionally, the membranes rupture even before the onset of labor, under the influence of the painless contractions.

Rupture having occurred, the cervix retracts, although it remains dilatable to the same degree. Then either:

1. The obstacle to delivery is insurmountable; the contractions become very energetic, and, if we do not interfere, the uterus, rarely, fortunately, ruptures, or the vagina is detached at the vaginal vault. There follows, usually, however, uterine inertia.

2. The obstacle to delivery is not absolutely insurmountable, the head tends to engage, it moulds itself gradually, and sometimes passes the superior strait. Again, on the contrary, engagement may be only partial, and the head remains imprisoned, as it were, until art assists it.

How now, and by what diameters does the head engage? If we interfere, is forceps or version preferable? These questions we will successively pass in review.

MECHANISM OF LABOR IN PELVIC CONTRACTIONS.

General Mechanical Phenomena.

The elements of the problem, as is readily apparent, are complex and multiple. In case of pelvic deformity, the head is not, as in the normal pelvis, engaged at the superior strait at the end of pregnancy. Often the only difficulty is this lack of engagement. That this may be effected, not only must the expulsory force be sufficient, but the obstacle to be overcome must not be too great, and the head must allow of considerable moulding, and its smaller diameters must adapt themselves to the smaller of the pelvis. Further, as we have seen, owing to the mobility of the fœtal head, abnormal presentations are frequent, those of the face and the brow being relatively common.

It is only since the time of Mauriceau and of Litzmann that a careful study has been made of the mechanical phenomena of labor in case of pelvic deformity, and latterly numerous works on this subject have been published.

We have already seen that Budin's researches prove that, in normal vertex presentations, the occipito-mental and occipito-frontal diameters really diminish in length; that it is the sub-occipito-mental diameter which increases the most, and that the diameters which diminish the most are, in order, the sub-occipito-bregmatic, the bi-temporal, the bi-parietal—the latter, contrary to the generally accepted opinion, altering the least. Does the same happen in case of pelvic deformity?

Otto de Haselberg divides deformed pelves into four categories:

1. *Pelves with Antero-posterior Diameter from* 4.22 *to* 3.69 *Inches.*—The head lies transversely at the superior strait in all varieties of contraction at this strait. This is necessary, seeing that the transverse diameter of the head, which is smaller than the oblique, occupies the conjugate of the pelvis, which is its least diameter. On the occurrence of contractions, the occiput descends, and since the conjugate is large enough to accommodate the bi-parietal, this engages, and the small fontanelle approaches the centre of the pelvis. In other words, the head flexes. The sagittal suture is at the same distance from the promontory and the symphysis, and the head is perpendicular to the plane of the superior strait. Naegelé's obliquity is only apparently present. The head thus descends transversely to the pelvic floor. It is only at this level that the occiput rotates forwards.

2. *Antero-posterior Diameter from* 3.69 *to* 3.16.—The head still lies transversely, but the bi-parietal diameter is too large for the conjugate, and this diameter cannot, therefore, engage. The head must flex, and this too, above the brim. This does not always happen, and then the occiput, lying between the promontory and the symphysis, becomes displaced, and the head beginning to extend, engages by its bi-temporal diameter. The sagittal sutures lie transversely across the centre of the pelvis; the larger fontanelle is nearer the centre than the smaller. It is readily apparent how a brow or face presentation may occur.

3. *Antero-posterior Diameter of* 3.16 *to* 2.64 *Inches.*—Here even the bi-temporal diameter is too large for the conjugate, and lies well above the conjugate, the head being transverse. Since it cannot enter, the anterior

extremity, which encounters the least resistance, slips down. The head extending, the bi-temporal diameter descends, until it lies against the upper border of the symphysis. The sagittal suture, although remaining transverse, is no longer in the centre of the cavity; the large fontanelle is low down and very near the promontory; behind the symphysis the upper border of the ear is felt; the head, in other words, is inclined to the plane of the superior strait by the anterior parietal, which is lower and more accessible. This inclined engagement of the head, is the more likely to be found where the *venter propendulus* exists. We have here Naegelé's obliquity.

4. *Antero-posterior Diameter below* 2.64 *Inches.*—Engagement is absolutely impossible, either by flexion or extension. The head remains above the superior strait, either obliquely or transversely, and no caput succedaneum is formed.

We see, in this connection, the influence of solidity, volume, and compressibility of the head, since, for example, a pelvis of the second degree may be readily transformed into one of the third, if the head is large and well ossified. Otto, however, lays the greatest stress on the position of the head, and this situation allows us to predict if the head can or cannot pass the contracted part.

As for the after-coming head, Otto say that, "once the trunk delivered, the head presents transversely at the superior strait, and this is normal, and the only position which will allow of engagement. Whatever the degree of contraction, we are obliged to interfere, and it is the bi-temporal diameter which is brought into the conjugate. The first effect of traction is to cause descent of the occiput and lessening of flexion. Consequently, the longitudinal diameter of the head, the occipito-frontal, coincides with the plane of the superior strait, the parietal protuberances slide laterally, and it is the transverse diameter anterior to these protuberances which engages in the conjugate, and this must be the bi-temporal, since all others are too large."

This mechanism, as we will see, is not that by which the head passes the conjugate, since the head must be flexed, instead of becoming extended. As Otto says:

"When the pelvis measures in the conjugate from 3.16 to 2.64 inches, the inclination of the head, which favored its engagement in vertex presentations, no longer exists where we are dealing with the after-coming head, and it is not necessary, since the head engages by its base, which presents no lateral projection, to stop it at the promontory or the symphysis. Only when the chin is anterior is the symphysis apt to interfere. Indeed, the whole difference between the before-coming and the after-coming head lies in its inclination, which exists in the first instance, and does not in the last." For Otto it is this inclination which retards labor in case of vertex presentation, and this is why he prefers version to forceps.

"Spiegelberg believes with Otto in the transverse presentation of the head, but with Michaelis he grants great obliquity of this head to the superior strait. The sagittal suture is very near the promontory. Since the bi-parietal diameter cannot pass the conjugate, it deviates towards the side of the fœtal back, and the occiput, therefore, is at or about the level of the linea innominata. It is here that the resistance is greater, and the temporal region sinks a little, and the bi-temporal diameter gains the conjugate; the anterior portion of the parietal bone, therefore, presents. Thus the lambdoidal suture lies above the symphysis, and one of the small temporal fontanelles is near the promontory. The large fontanelle is a little lower than the small, nearer the promontory, and a trifle laterally. The finger may traverse the greater part of the anterior parietal bones. The head adapts itself to the superior strait as follows: The posterior parietal portion flattens against the promontory, Naegelé's obliquity becomes rectified, and this parietal portion slides backwards. The head flexes, the small fontanelle and the occiput descend, and the head rotates with ease."

Dohrn rejects the mechanism of labor as described by Otto, or, at least, admits it only exceptionally. "In accord with Michaelis and Spiegelberg, he states that the occiput and the forehead are relatively free to the right and to the left, and the force which brings about accommodation in the conjugate is expended in the lowering of the anterior part of the parietal, and in a notable flattening of the posterior part. The head adjusts itself in the conjugate by its small oblique diameter. Thus the occiput descends, and it is not the parietal protuberance which slides under the promontory. This acts on the coronal suture, which it cuts from behind forwards. Either the promontory pushes the parietal in the direction of the ear, or else it acts from behind forwards and from above downwards, compressing the coronal suture. This last mechanism is the rule." Dohrn hence concludes that version offers no advantages, since both in case of before and after-coming head disengagement occurs by the small oblique diameter.

Both Simpson and Radford have studied the mechanism of labor in pelvic deformity, and they agree in the belief that the after-coming head passes more readily than the before-coming, and both prefer version to forceps.

From Simpson's researches (V. Figs. 119 and 120), the following conclusions are drawn: "1. The fœtal head has the shape of a cone with base upwards, and, when the trunk is first delivered, the smaller part of this cone may usually engage in the superior strait. (Fig. 121.) 2. The solid hold given by the body of the fœtus when it is delivered first allows us to use force enough to cause compression of the head, and to bring, if need be, the elastic and larger part of the cone into the greatest space in the contracted pelvis; 3. The head, drawn through the contracted pelvis, generally so adapts itself, or may be caused to adapt itself in such a manner as to bring its smallest diameter, the bi-temporal, instead of the

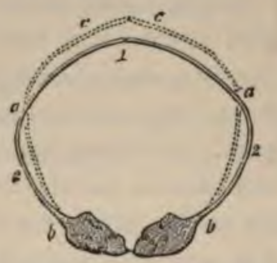


FIG. 119.—EFFECT OF PRESSURE AT THE SUMMIT OF THE CRANIAL VAULT. When the head presents, the dotted line, *c*, *b*, *b*, *c*, is the vertical section. The line 1, 2, 2, shows the disadvantageous alteration in form caused by head presentation in deformed pelvis.

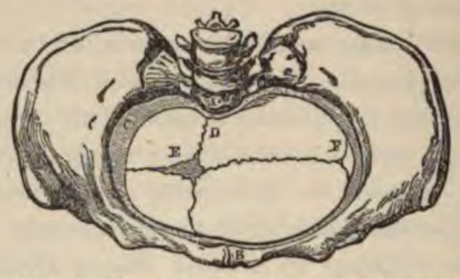


FIG. 120.—SHAPE ASSUMED BY THE FŒTAL SKULL IN PASSING THROUGH THE CONTRACTED SUPERIOR STRAIT. *A*, Promontory of Sacrum. *B*, Pubic symphysis. *C*, Free space between the iliac bone and fœtal forehead. *D*, Depression in skull, corresponding to sacral promontory. *E*, Anterior fontanelle. *F*, Posterior fontanelle.

bi-parietal, into the most contracted diameter of the pelvic strait; 4. The cranial vault is more readily compressed when the force is applied to its lateral surfaces, as it is in case of the after-coming head, and not, as in case of the before-coming head, partially to its lateral and partially to its superior surfaces."

To justify this theory, Simpson states the following practical conclusions: "1. The duration and hence the danger of labor is diminished by version. Therefore version should be resorted to as soon as dilatation is complete, without waiting for engagement of the head, and, in consequence, before inertia can set in. 2. The compression of the fœtal head is compatible with its life. 3. The traction to which the fœtal neck is subjected is not incompatible with fœtal life. 4. The risk of death from compression of the cord is not great enough to cause the rejection of version. 5. Energetic but rapid compression is less dangerous to mother and to infant than less but prolonged compression. 6. Local lesions of the vagina, fistulæ, etc., are more likely to result from forceps than from version. 7. The risk of rupture of the uterus during version has been exaggerated."

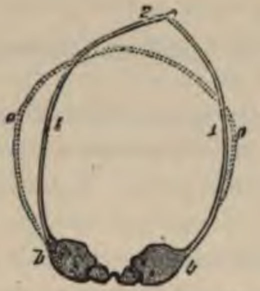


FIG. 121.—SHAPE ASSUMED BY SKULL UNDER THE INFLUENCE OF LATERAL COMPRESSION OF THE VAULT BY THE CONTRACTED SUPERIOR STRAIT, IN DELIVERY BY AFTER-COMING HEAD. The dotted line, *ab*, *ab*, represents vertical section of normal head. The contour, 1, 2, 1, shows the change in shape which occurs when the fœtus is extracted by the feet in a contracted pelvis.

Simpson gives the following figures in regard to comparative mortality.

	Forceps.	Version.
Infants, ...	1 out of 3 . .	1 out of 3½
Mothers, ...	1 " 5 . .	1 " 15

Schroeder also admits the transverse presentation of the head, but he believes that in contracted conjugate the greater resistance is much nearer the occiput than the forehead. The anterior part of the head, he says, descends, until the smaller transverse diameter, which is also more compressible than the greater transverse, engages in the conjugate. (See Figs. 122 and 123.)

We see, therefore, that authorities are not absolutely in accord in regard to the manner after which the head engages. The endeavor has been made to prove by the deformity of the head that one or another diameter engaged in and passed through the conjugate. These deformities, however, are not at all constant as to site. The only point which is at all appreciable is the degree and the form of the contraction. Labor will, of course, be all the more difficult, the greater the degree of contraction.

Mechanical Phenomena in different Forms of Pelvic Contraction.

Litzmann has studied this question with the greatest care, in particular the three classic forms of contraction: 1. Generally and regularly contracted pelvis. 2. Flattened pelvis. 3. Generally contracted flattened pelvis.

1. These pelves measure ordinarily at least 3.5 inches in the conjugate, and Litzmann has never seen a case where the measurement was under 3.12 inches. We have seen a case where the measurement was only 2.9 inches, and we do not agree with Litzmann in classing such cases in the third category. The anomalies in shape and situation of the uterus are possibly less frequent in this form than in the others. The pendulous abdomen is uncommon, and abnormal presentations are relatively rare. But seeing that the contraction involves the entire pelvis, and not alone the superior strait, the difficulties in delivery are often very great, even to the extent of requiring cephalotripsy.

In 1821, Mampe first called attention to the mechanism of labor in these cases, and Michaelis, agreeing with him entirely, insists on the fact that the head engages by its occipital portion. According to Litzmann, this descent of the occiput occurs in all pelves where the transverse diameter is shortened. In the regularly contracted pelvis, the lesser fontanelle is at a lower level than the greater, and remains so during the entire period of descent, until the brow reaches the promontory, when, as it descends, the occiput rises a little behind the pubes. Further, a very characteristic phenomenon according to Michaelis, the head remains mobile, and is not fixed in the sub-occipito-frontal diameter. The sagittal suture is at times transverse, again oblique, and sometimes antero-posterior with reference to the superior strait. Not infrequently, in these cases, the occiput now rotates anteriorly, now posteriorly, now descending and again rising.

When the head presents transversely the two parietals are on the same level. When we find the sagittal suture near the promontory, this is not due to the contraction alone, but to the fact that Naegelé's obliquity is very pronounced. This is rare, however, and ordinarily this suture is towards the front of the pelvis, and the anterior portion of the parietal presents. These irregularities in position soon correct themselves.

Stein contends that rotation of the occiput occurs at the pelvic floor, while Litzmann says that it occurs earlier, as soon, indeed, as the descent of the occiput renders engagement possible; and he has at times already found the sagittal suture in the antero-posterior diameter of the pelvis, while the forehead was still above the superior strait.

The gravest cases are those in which the head is extended instead of being flexed.

While a number of authorities believe that, in the regularly and generally contracted pelvis, presentations of the pelvic extremity offer greater difficulties than those of the vertex, Litzmann and Michaelis oppose this view, and say that, on the contrary, when the chin has once descended, the head passes even more readily than in the flattened pelvis, and rotates with greater ease. According to them it is not the squamous suture, but the posterior part of the frontal which is subjected to pressure at the promontory. (Fig. 122.)

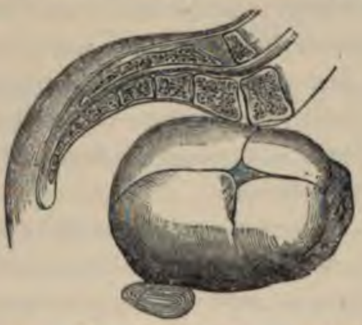


FIG. 122.—ENGAGEMENT OF THE HEAD IN CASE OF REGULARLY AND GENERALLY CONTRACTED PELVIS. (*Schroeder.*)

Ruptures of the uterus and of the vagina do not seem to be more frequent in this variety of deformity, but owing to the pressure of the fœtus along the entire canal, sloughs oftener occur. The caput succedaneum is ordinarily large, but the impressions left on the skin of the skull are not especially marked. A characteristic of this variety of contraction is that the mark left by compression at the promontory is found on the posterior portion of the parietal bone, at equal distance from the coronal and the sagittal suture, extending, according to the degree of descent and the period of rotation, from the parietal protuberance to the external angle of the eye, or towards the cheek. Where, however, the head, through deep descent of the occiput, engages by its sub-occipito-frontal diameter in the conjugate, the depression due to the promontory is on the anterior part of the parietal, and extends nearly parallel to the frontal suture. The sutures generally overlap, the occipital bone being pushed under the parietals, one lateral part of the skull, in a word, overlaps the other. The posterior parietal is flattened, the frontal bone only when rotation occurs early. (V. Figs. 124 to 129.) In case of delivery by the breech, the depression is found on the posterior part of the frontal. This form of pelvis is of grave import both for the mother and the child.

2. The simply flattened pelvis, rachitic, or not, is the most common form. The only difference lies in the fact that, in the rachitic, the flattening at the superior strait is more marked, since the conjugate is more contracted, the transverse diameters being not only relatively, but absolutely enlarged. We have already noted the complication of retroversion, pendulous abdomen, faulty presentations, and prolapse of limbs or cord. The obstacle to delivery is at the superior strait, and this once overcome, labor may be quickly terminated.

Michaelis has given the most exact description of the mechanism of labor, and Litzmann's researches have confirmed the truth of the former's conclusions. "As a general rule, the head is transverse at the superior strait, although, at the outset, the sagittal suture may be a trifle inclined obliquely. Rotation rarely begins until the two parietals are entirely engaged in the pelvis. The marks left by promontoric pressure, varying from a simple line to a depression, ordinarily extend from the sagittal suture along the coronal, towards the temple and the cheek. The more this mark deviates from this direction, in front of the external angle of the eye, the more likely it is that the pelvis is not only contracted in the conjugate, but also, more or less, in all the other diameters. Only exceptionally does the head engage with its long diameter in one of the oblique of the pelvis, and it is in these cases that we find deep descent and engagement of the occiput. (V. Fig. 123.) Usually the anterior part of the head is the lowest. The larger fontanelle is in the centre of the cavity, while the smaller is almost inaccessible, and may be even above the superior strait. During engagement, the occiput descends still more, but usually, when the head is fixed in the conjugate, it remains transverse, and the greater fontanelle is felt to proceed gradually from the centre of the cavity toward one of the sides of the pelvis, while, on the other hand, the lesser fontanelle becomes more accessible. Sometimes engagement of the head occurs slowly, sometimes rapidly, until, flexion having been completed, rotation begins. The parietal tuberosities, meeting resistance in the conjugate, slide to the side, supposing always that, between the wings of the sacrum and the pubic crests there exists space enough to admit of the bi-parietal diameter, and that the transverse of the pelvis is large enough to accommodate the occipito-frontal diameter. The two parietals rarely descend on the same level, only when the disproportion between the skull and the conjugate is not very pronounced. As a rule, the posterior parietal is the one which is stopped by the promontory, only exceptionally is the anterior parietal interfered with by the symphysis. (See Fig. 123.) In the first instance, Naegelé's obliquity is exaggerated, and the mechanism of engagement is as follows: While the border of the anterior parietal bone rests on the symphysis, the posterior parietal, situated at the level of the promontory, flattens out, and describes an arc of a circle around the anterior point, which slowly brings the sagittal suture into the centre of the pelvis. At the same time the head rotates

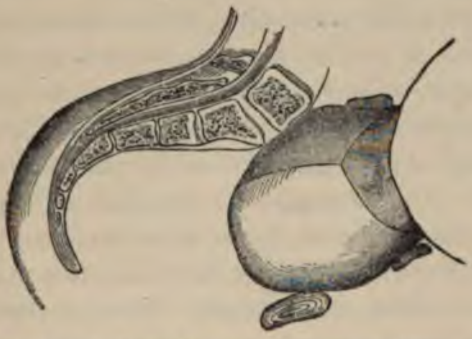


FIG. 123.—ENGAGEMENT OF THE HEAD IN THE FLATTENED PELVIS. (*Schroeder.*)

around its longitudinal axis, flexes, and the occiput descends. The two movements are combined, sometimes one, and again the other, being accentuated. In the second and rarer instance, it is the anterior parietal which rotates behind the symphysis.

"In pelvic presentations, the head is always transverse; according to the degree of contraction, the head may be either engaged in, or else retained above the superior strait. In the first instance, flexion has already begun, and engagement takes place successively by the bi-temporal, and then by the bi-parietal, and while the squamous portion of the anterior parietal passes behind the symphysis, the posterior parietal rotates under the promontory. If the resistance offered by the pelvis is great, either the anterior inferior angle of the posterior parietal is simply depressed, or it is forced down towards the tuberosity. If the occiput has descended into the cavity at the same time as the chin, and this is very rare, if even it is lower than the chin, a line running the length of the coronal suture on the posterior parietal, indicates the pressure exerted by the promontory during the passage of the lateral region of the parietal protuberance along the promontory. Only exceptionally does such a degree of extension occur as will permit the descent first of the occiput along the promontory. The maternal lesions will be found at the promontory and the symphysis, and may even be of the nature of sloughs. When the contraction is great, the markings on the fœtal head are on the posterior parietal, between the tuberosity and the greater fontanelle, at a greater or less distance from the sagittal suture.

"The overlapping of the sutures is much rarer than in the preceding degree of contraction, but the displacement of the two lateral halves of the skull is much more frequent. The posterior parietal is flattened. Grooved depressions are often found, cone or spoon-shaped seldom. (See Figs. 124 to 129.)

"3. In the generally contracted flattened pelvis, at the beginning of labor, the head is almost always above the superior strait. It is still transverse, obliquity only being possible where the head is small and compressible, or the contraction slight. Whenever engagement is caused by the contractions alone, then it is by the occiput. Presentation of the anterior parietal is sometimes seen, of the posterior rarely. In pelvic presentations the head can only engage when markedly flexed.

"The mechanism is then the same as in the simply flattened pelvis. The depressions are found between the middle and superior portion of the coronal suture and the parietal protuberance. These are situated nearer the suture, when the longitudinal diameter of the skull is near the antero-posterior diameter of the pelvis; they are the further from the sagittal suture the nearer the longitudinal of the head is to the transverse diameter of the pelvis. The maternal parts are liable to serious injury, and the risk for the mother and the child is great."

Schroeder, from the study of deformity of the head in pelvic contraction, reaches the following conclusions: "Aside from depressions and marks of compression, when the fœtal head remains for long in a deformed pelvis, it undergoes modifications in shape, persisting after delivery, which approach one of the two types, the dolychocephalic or the brachycephalic; sometimes there being a shortening in the transverse diameter, and again in the longitudinal of the head."

Stadfeldt first called attention to the asymmetry of the head, involving particularly the occipital bone, the left side projecting more and being rounder than the right. Welker has found that the distance between the brow and the parietal protuberances is greater to the right than to the left, and attributes this fact to the greater frequency of left positions, and the pressure exercised by the pelvic bones during the last months of pregnancy. Dohrn, however, considers this lateral flattening the result of labor. (Fig. 125.) Schroeder, by measuring fœtal heads, one half to one hour or more after delivery, found, in 30 cases, that the distance between the parietal and the occipital protuberances was:

Smaller from left to right, ...	11 times.
Larger, ...	17 "
Equal, ...	2 "

From the eighth to the fourteenth day after delivery:

Smaller from left to right, ...	18 times.
Larger, ...	7 "
Equal, ...	5 "

Congenital asymmetry of the skull, therefore, really exists, but Dohrn's researches are still of value. Ordinarily, the posterior parietal is pushed under the anterior, although there are many exceptions. When the conjugate is contracted, without or with general contraction, the anterior is at least as frequently pushed under the posterior, while in generally regularly contracted pelves the reverse is true. In contracted pelvis, overlapping of the frontal bones is very frequent, and the frontal bones of the same side as the parietal overlap together. The occiput is pushed under the parietals, and is rarely above. (V. Figs. 124 to 129.)

4. In the oblique oval pelvis the progress of labor depends, on the one hand, on the dimensions of the pelvis, and, on the other, on the degree of obliquity and of lateral displacement. If the lateral flattening is slight, the promontory deviated but little, the sagittal suture of the head, and this is ordinarily the case, may lie in the greatest oblique diameter, and labor may be terminated; but, if the sacro-cotyloid diameter is much decreased, then the shape of the pelvis approaches that of the generally contracted and the mechanism is similar. In general, disengagement of the head is very easy when the sagittal suture occupies the shortened oblique diameter of the superior strait. Whence the advice to perform version in order to bring the occiput into the most capacious part of the pelvis.

5. In the osteomalacic pelvis, only exceptionally is labor ended by the forces of nature. It is a deformity which generally calls for intervention, the Cæsarean section, and therefore we can hardly describe a mechanism. Nevertheless, before resorting to this operation we should assure ourselves that the pelvis is not dilatable. Cases where labor has been completed, in this instance of deformity, have been recorded by Welchmann, Barlow, Hull, Lange, Feist, Olshausen, Kilian, Hugenberger, Winckel, etc., etc.

6. In the kyphotic pelvis, the head of the fœtus does not assume an oblique situation as in the normal pelvis, or a transverse as in the rachitic, but a direct position in order to adapt itself to the greatest diameter, the antero-posterior. The head, indeed, meets with no obstacle to speak of until it reaches the inferior strait, but the prognosis, as we will see, is not very good.

7. In the pelvis where there has been a single or double luxation, the obstacle resides in the exaggerated inclination of the pelvis, and on its flattening, for, once the head engaged, the size of the inferior strait, the little height of the pelvis, the increase in the transverse diameter, these help the progress of the head, and labor is often spontaneous. It is then the primitive inclination of the head which is the real obstacle, and this once corrected, the head engages, and the mechanism is the same as in the flattened pelvis. Where the luxation is one-sided, the difficulty is sometimes greater.

PROGNOSIS.

Deformity of the pelvis always entails dangers both to the mother and the child. Even in the case where the contraction is slight, labor is prolonged, and we know that both maternal and fœtal mortality increases proportionately with the duration of labor. Happily by means of the premature induction of labor, we are able to diminish considerably the dangers run by both the mother and the child.

The greatest risk which the mother runs is from injury to the soft parts, the greater, of course, the more prolonged the labor. Energetic and momentary pressure is less dangerous than feeble and prolonged, and hence a reason why version is advocated. As the result of pressure between the head and the pelvis, this organ may rupture. Again, prolonged pressure may lead to sloughing, and the resulting fistulous openings from the vagina and uterus into the bladder and rectum. In rare instances, the passage of the head has caused rupture of the pelvic symphyses. Ahlfeld was able to collect twenty-one cases of this nature in osteomalacic pelves, and almost exclusively with vertex presentations. Ordinarily, however, as we will see, these lesions follow on manual or operative manœuvres. Finally, the operations which we may be called upon to perform constitute an additional risk for the mother. Budin, in 1880, mentioned: lesions of the vulva and of the perineum, and tears of the vagina; ruptures of the cervix and uterus; fistulæ; injury of the intestine, and hernia into the vagina or uterus; pelvic abscesses; traumatic paralyses; rupture or separation of the symphyses; fractures of the bones, already noted by Bailly.

The consequences for the infant are not less. The prolongation of labor, the premature rupture of the membranes, the prolapse of the cord or limb, all seriously compromise its existence. Further still, the increased strength of the uterine contractions interferes with the fœtal circulation, and occasionally induces premature separation of the placenta.

Aside from these complications, vertex presentations expose the infant to special risks of varying gravity.

We mention the caput succedaneum, which, although when limited, is of favorable nature, when it spreads beyond the scalp may be of serious nature; the modifications in shape of the fœtal head; the impressions

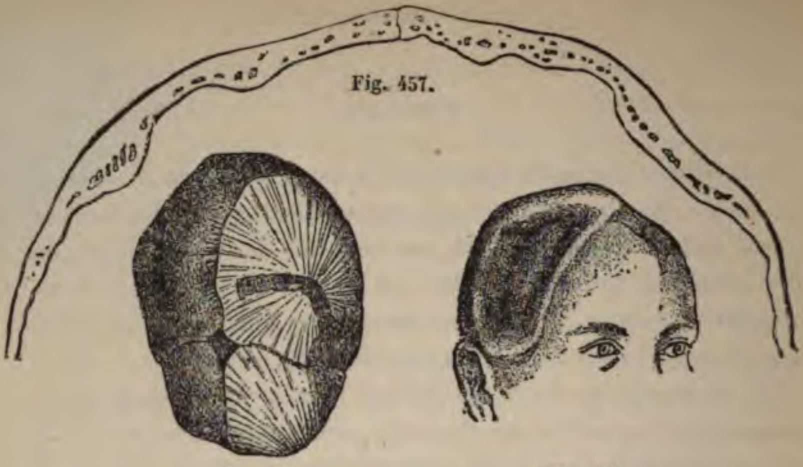


Fig. 457.

Fig. 458.

Fig. 459.

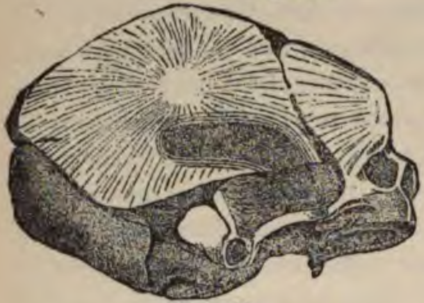


Fig. 460.

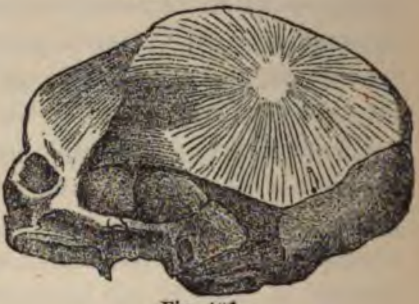
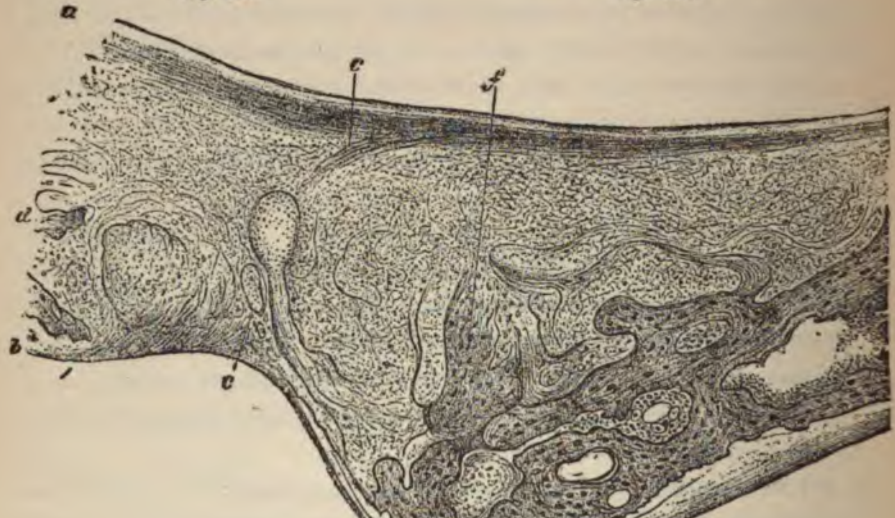


Fig. 461.



For description of above figures, see page 123.

superficial or deep; the deep overlapping of the sutures; true fractures—these, obviously, are of grave import to the health of the child.

Pajot, in 1853, classified these lesions as follows:

"1. *Face and Head.*—Wounds, contusions, edematous and bloody tumors, hemorrhages into the brain and the meninges, depressions of the bones with and without fracture, compression of the brain, facial paralysis.

2. *Neck.*—Rupture of the vertebral column, tearing off of the head.

3. *Body.*—Rupture of the vertebræ, contusions of the abdominal viscera, the liver in particular, rupture of the cord, lesions of the scrotum.

4. *Limbs.*—Fractures, dislocations, separation of the epiphyses." We would add the traumatic paralyses of the new-born.

In 26 infants Michaelis found compression marks on 15, in 5 of which there was sloughing. Ten were right positions, and sixteen left. The mean duration of labor had been 27 hours, and the duration after rupture of the membranes from 1 to 5 hours.

In 27 cases Olshausen found:

Simple impressions, ...	19 times.
Double "	5 "
Triple, "	2 "
Quadruple "	1 "

In 32 instances these marks were on the side of the head turned to the promontory; in 20, on the parietal bones; in 9 on the frontal; in 2 on the

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FIGS. 124 AND 129.—(*Kehrer.*) LEFT PARIETAL OF A YOUNG CAT, WITH DEEP DEPRESSION AND FRACTURE OF THE SKULL, PERSISTING FOR FOUR DAYS AFTER BIRTH. Cured at the end of eight days. Animal killed and the bones examined. *a*, External surface. *b*, Internal surface. *c*, Depression site.

FIG. 129.—SECTION AT THE LEVEL OF THE DEPRESSION. Three fissures are seen projecting towards the dura mater. *a*, Fibrillar stratum of the pericranium. *b*, Dura mater. *c*, Compact tissue, deposited at the borders of the fracture, rich in connective tissue cells. *d*, Bony lamellæ. *e*, Crenated borders of the fracture. *f*, Net-work of bone substance, forming in places a solid layer at the level of the fracture.

FIG. 125.—CRANIAL IMPRESSIONS AND DEPRESSIONS. (*Dohrn.*) Primipara. Flattened pelvis, slightly, generally and regularly contracted. Vertex presentation, O.L.A. Premature labor induced at thirty-fifth week; duration of labor 1¾ hours. Caput, diffuse, on right parietal. Entire left side of head flattened and displaced anteriorly, the parietal bone overlapping the frontal. On left parietal exists an impression extending from the greater fontanelle, along the parietal protuberance, and ending in a deep depression between the squamous portion and the frontal suture. The descent of the left parietal had been prevented by the promontory.

FIG. 126.—SPOON-SHAPED DEPRESSION. (*Ruge.*) Child left hospital alive. Depth of depression about 1¼ of an inch.

FIG. 127.—DEPRESSION OF THE SKULL. (*Martin.*) About ⅛ of an inch above the right parietal protuberance; a depression about .39 inches deep and .2 inches wide.

FIG. 128.—APPEARANCE OF DEPRESSION ON LEFT SIDE OF SAME HEAD AS IN FIG. 127. The length is about .7 inches.

coronal suture; in 1 on the temporal bone, in 1 at the centre of the sagittal suture, etc. Figures 124 to 129 represent various lesions which have been found on the fœtal head, in cases of pelvic deformity.

The Treatment of Pelvic Deformities.

The prognosis is in a measure dependent on the treatment, and in regard to this authorities are not at all in accord. In France it is to the forceps; in Germany and in England preference is given to version. We will, therefore, precede our remarks on treatment with a comparative study of the value of these two methods in cases of pelvic contraction, seeing that the partisans of version base their preference on the mechanism of labor.

We have already noted how Otto de Haselberg, Litzmann, Michaelis, and others explain this mechanism, and we have stated why Simpson believed that the after-coming head passed more readily than the before-coming.

In 1865, Joulin stated that in order that an observation may throw light on this question of forceps or version: 1. The diameter of the pelvis and of the head should be indicated with care. 2. The form of the contraction should be stated, since one operation may in truth be indicated in one form of pelvic deformity, and contra-indicated in another. 3. That both forceps and version have been attempted on the same patient, since otherwise the doubt exists as to whether the operation not attempted would have not succeeded as well as the one which did. He then dissects with care Simpson's monograph, and shows: 1. The vertex relatively to the parietal protuberances forms the apex of a cone, shorter, it is true, than that bounded by the bi-mastoid diameter and the parietal protuberances, but not at all like the diverging branches of an A, and further the vertex has never been found flattened out by the pelvis. When labor has been long in progress, the head is greatly flexed, and then it is not the bregma which presents, but a point very near the occiput, which forms the apex of a cone, with the parietal protuberances as its base, and which is higher than, but not as thick as, the parieto-mastoidean cone at its apex. Simpson's theory, therefore, falls to the ground, for it is clear that if version only brings to the superior strait the same diameter that the forceps seizes, the operation does not compensate for the risks it involves. 2. The grasp which we have of the infant's body is not at all better than that which is furnished by the forceps, and if in slight contractions we obtain reduction of the head, may this not be at the expense of the fœtus? 3. Not only is the head placed by the forceps even as by version, so that the small diameter, the bi-temporal, engages in the least diameter of the pelvis, but, further, the forceps engages the head by its sub-occipito-bregmatic circumference, while version engages it by the occipito-frontal. 4. Finally, when labor has been prolonged, the head is strongly flexed, hence it has no tendency to engage by the bregma, but by the apex of the occipito-parietal cone. Joulin further establishes by experiments, that the total force necessary to engage the fœtus by the after-coming head is greater than when it comes before, and he naturally gives the preference to the forceps, except in case of oblique oval pelves.

In 1864, McClintock, as the result of clinical experience, pronounced in favor of version. His observations were based on 11 multiparæ, and of the 63 infants, 16 were delivered by version and 9 lived. Of the remaining 47, born some without intervention, and others by forceps, 18 lived. Of the mothers delivered by version, but one died. In none of these cases was the contraction marked.

Martin prefers the forceps, and only resorts to version when, 1, the transverse diameter is long enough to allow the occiput, the thick part of the head, to lie alongside the promontory; and 2, in the oblique oval pelvis, when the contraction is to one side, when the promontory is deviated laterally, etc.

Kristeller accepts Martin's teaching. Frank rejects version altogether.

Scharlau is an earnest advocate of version. He has resorted to it in case of the following complications:

Transverse presentations, podalic version,	44
Premature attempts with forceps, podalic version	1
Prolapse of the cord, vertex presenting,	8
Rupture of the uterus, and passage of fœtus into abd. cavity,	1
Mal-presentations of the head,	5
" " vertex, prolapse of feet,	1
" " " " " cord and hand,	2
Placenta prævia,	1
Lateral presentation of head, (ear),	1
	64

Internal version was performed 61 times, and external 3. Of the children, 14 were dead before operation. He obtained 43 living children. Of the mothers, 5 died, 2 of phlebitis, 1 of peritonitis, 2 of rupture of the uterus. In 12 cases the contraction was considerable. He draws the following conclusions: 1. Version allows us to save children which would otherwise die from prolonged labor. 2. The small diameter of the pelvis may be shortened to 2.9 inches, and still version is practicable, at term, and with resulting living children. 3. In version, in case of vertex presentation, it is of advantage, although not indispensable, for the transverse pelvic diameter to be large enough to enable the larger part of the occiput to pass near to the promontory.

Fuhrmann, in 1868, prefers version in case of partially contracted pelvis, but rejects it in other forms.

Schroeder prefers version to forceps. He believes the operation indicated in contracted pelves whenever, dilatation being complete, the head remains movable above the superior strait. It is then inoffensive for the mother. In support of this opinion, he cites 36 cases of version, 5 children being dead before operation. Of the 31 remaining, 18 were living, 3 lived but a few hours or days, 10 were delivered dead or dying.

In	9	cases	shoulder presentation, . .	9 living children	
In	1	case	asphyxia before version, . .	1 dying child	
In	2	cases	eclampsia and placenta prævia,	1 living,	1 dead
"	6	"	prolapse of cord, . . .	2 "	4 "
"	13	"	rachitic pelvis, 3.7 to 2.7 inches,	11 "	2 "
"	1	case	" " 3.4 "	1 living	
"	1	"	" " 2.7 to 2.9 "	1 "	
"	1	"	" " 2.8 " 2.5 "	1 "	

He concludes as follows: 1. Even in case of pronounced contraction we may hope for a living child by version. 2. Version is more favorable to the child than labor by the vertex. 3. It is more favorable for the mother than the forceps. 4. Energetic, momentary pressure is less grave for the mother and the child than continuous, persistent pressure.

Strassmann, in 4 cases of irregularly contracted pelvis, saved 3 children, 1 being dead before. In previous deliveries, twice perforation had been resorted to, and twice the forceps had extracted dead children.

Otto de Haselberg, although a partisan of version, admits that we cannot always bring the occiput into the roomiest part of the pelvis. In 14 cases practised by him. 6 times the head engaged differently from what he desired.

If now we add together the statistical tables, compiled by Stanesco, and by Rigaud, in connection with the results in various degrees of pelvic deformity, we obtain the following:

Pelves measuring 3.9 and over in sacro-sub-pubic diameter, or at least 3.5 in sacro-pubic:—301 cases:

216 spontaneous labors .	Mothers,	13.88	per cent.	died
	Infants,	15.74	"	"
21 versions, . . .	Mothers,	23.8	"	"
	Infants,	66.60	"	"
51 forceps, . . .	Mothers,	35.29	"	"
	Infants,	54.90	"	"
1 craniotomy, . . .	Mother,	0		"
3 premature labors, . .		33.33	"	"
7 cephalotripsies, . .		42.86	"	"
2 forceps, cephalotripsy, craniotomy, version, .		50	"	"

Pelves measuring from 3.9 to 3.5 in sacro-sub-pubic diameter or from 3.5 to 3.1 in sacro-pubic:—215 cases:

84 spontaneous labors, .	Mothers,	9.52	per cent.	died
	Infants,	36.90	"	"
15 versions, . . .	Mothers,	26.66	"	"
	Infants,	80	"	"
60 forceps, . . .	Mothers,	28.33	"	"
	Infants,	31.66	"	"
6 craniotomies, . . .	Mothers,	33.33	"	"
25 cephalotripsies, . .		32	"	"
17 premature labors, . .	Mothers,	17.66	"	"
	Infants,	47.05	"	"
8 forceps, cephalotripsy, version,	Mothers,	75	"	"

Pelves measuring 3.9 to 3.5 in sacro-sub-pubic, 2.7 to 2.3 in sacro-pubic:—93 cases:

11 spontaneous labors, .	Mothers,	9.09	per cent.	died
	Infants,	45.45	"	"
20 forceps, . . .	Mothers,	10	"	"
	Infants,	60	"	"
3 versions, . . .	Mothers,	100	"	"
	Infants,	100	"	"
2 craniotomies, . .	Mothers,	0	"	"
38 cephalotripsies, . .	"	23.68	"	"
18 premature labors, .	Mothers,	27.77	"	"
	Infants,	66.66	"	"
1 Cæsarean section, .	Mothers,	100	"	"
	Infants,	100	"	"

Pelves measuring 3.5 to 2.7 in sacro-sub-pubic, or 2.7 to 2.3 sacro-pubic:—42 cases:

1 spontaneous labor, .	Mother,	100	per cent. died
	Infant,	100	" "
4 versions, . . .	Mothers,	50	" "
	Infants,	100	" "
5 forceps, . . .	Mothers,	40	" "
	Infants,	40	" "
2 craniotomies, . .	Mothers,	50	" "
10 premature labors, .	Mothers,	40	" "
	Infants,	90	" "
20 cephalotripsies, . .	Mothers,	40	" "

Pelves measuring 2.7 to 2.3 in sacro-sub-pubic, or 2.3 to 1.9 in sacro-pubic:

Spontaneous labor, . .	Mothers,	100	per cent. died
	Infants,	100	" "
1 forceps, . . .	Mother,	100	" "
	Infant,	100	" "
5 premature labors, . .	Mothers,	40	" "
	Infants,	100	" "
5 cephalotripsies, . .	Mothers,	20	" "
4 Cæsarean sections, .	Mothers,	100	" "
	Infants,	0	" "

We have ourselves delivered a child living, but dying in 24 hours, by the forceps, through a pelvis contracted to 2.1 inches. It was at seven months.

Borinsky's statistics may be resumed as follows:

			Children.	
			Living.	Dead.
Delivery by vertex, . 322	Spontaneous,	233	192	41
	Forceps, .	50	36	14
	Perforation,	39		39
Version, vertex presenting, 45	Not complicated,	16	6	10
	Complicated,	29	15	14

Reduced to percentages:

	Children.	
	Living.	Dead.
Spontaneous labor, ...	82.4	17.6
Forceps, ...	72	28
Version, ...	53	53

Borinsky prefers the forceps, and reserves version for the cases where there is abnormal deviation of the head, presentation of the face and brow, and procidence of the cord or limbs. In the face presentations which he has observed, he used the forceps twice out of 13 cases, and in both instances had living children. In 7 instances version was necessary, and 5 children were extracted dead.

Vertex Presentations—Delivery. *Version.*

Shape of Pelvis.	No. of Cases.	Termination.	No. of Cases.	Infants.		Without Complication.			With Complication.		
				Living	Dead.	Cases.	Infants. Living	Infants. Dead.	Cases.	Infants. Living	Infants. Dead.
Flattened,	267	Spont. Labor	206	170	36						
		Forceps.	33	22	11	13	6	7	22	12	10
		Perforation.	28		28						
Generally contracted,	31	Spont. Labor	14	11	3						
		Forceps.	12	9	3						
		Perforation.	5		5						
Funnel-shaped,	7	Spont. Labor	3	2	1						
		Forceps.	3	3							
		Perforation.	1		1						
Generally flattened, contracted,	18	Spont. Labor	6	5	1						
		Forceps.	1	1		7		2	5	1	4 (2 perforation.)
		Perforation.	4		4						
Asymmetrical, . .	9	Spont. Labor	4	4							
		Forceps.	1	1		3		1 with perforation.	2	2	
		Perforation.	1		1						

Barnes, 1873, after recalling the mechanism of labor, concludes that version is applicable to pelves of 3.1 to 3.5 inches. At 3.1 inches the forceps is equally applicable. Under 2.9 inches he absolutely rejects it.

Otto de Haselberg, 1873, endeavors to justify his preference for version by a purely mechanical explanation. According to him, in presentation of the vertex, where the pelvis is relatively too narrow, the inclination of the head to the superior strait, instead of being disadvantageous, is indispensable, since it allows the head to engage. With the after-coming head, aside from the solid grasp which we have on the trunk, the head is in a still more favorable position. It is perpendicular to the plane of the superior strait, and two symmetrical points are between the promontory and the symphysis. The small transverse diameter is shortened by the compression of the head, and this diameter is already shorter than the great oblique, which is the one by which the before-coming head passes the superior strait. In this respect, then, he agrees with Mme. Lachapelle.

Schatz simply cites figures: He has practised version forty to fifty times in contracted pelves, and has usually obtained living children. The majority of the women had, in former labors, been delivered of dead children by forceps or perforation. Nevertheless, he has observed deep depressions, fractures of the skull, six times fracture of the clavicle, and once of the arm. According to him, the obstacle in case of forceps is Naegelé's obliquity, which does not exist in case of version. The force used in version is less than with forceps. He never, however, resorts to version until dilatation is complete. An arm must always be brought down, but rotation of the back forwards is not always indispensable; the head must not be extracted quickly, but, before resorting to traction, two fingers should be inserted in the mouth to give the head a good position. The operation should be avoided in primiparæ; he does not resort to Kristeller's expression. [A most valuable adjunct, nevertheless, for the delivery of the after-coming head.—Ed.]

Ahlfeld rejects version. He awaits spontaneous labor as long as possible, and resorts to the forceps as a last resort.

Cohnstein, envisaging the question from the standpoint of compression of the fœtal head, concludes: 1. The after-coming head passes more readily than the before-coming, since in the former instance there is produced a diminution in the cephalo-rachidian fluid, and, in consequence, a greater overlapping of the sutures, and greater reduction in size of the head. 2. In medium contractions, it passes more readily because its bony walls and the maternal parts are more closely in contact, and this favors accommodation, as well as evacuation of the cerebro-spinal fluid. 3. Still, in case of the after-coming head, the life of the child is more compromised, because, on account of the above occurrence, the brain is more compressed.

And yet Schatz, believing the life of the mother is of greater value than that of her child, and tractions with the forceps more dangerous for her than the traction on the trunk, resolutely favors version.

Löwenhardt considers version and extraction as the heroic measures in case of pelvic deformity. He maintains that by version we cannot place the head symmetrically. He only succeeded twice in nine attempts, and in five cases he had to use forceps to extract the after-coming head. He is opposed, however, to waiting for spontaneous labor, and prefers the forceps only when: 1. The pelvis is large enough to admit the passage of the child without mutilation. 2. The child is living. 3. The child presents by the vertex. But whether for forceps or version, the pelvis must be at least 2.9 inches.

He endeavors to explain his preference for forceps by the data, on following page, which, however, are of little value, seeing that the degree of contraction is but vaguely indicated.

Goodell, in two monographs, 1875, 1876, advocates version at term. "If the contraction is slight, he makes one or two attempts with the forceps. If the head cannot be thus engaged, version must be resorted to. In pelves where the conjugate measures from 2.7 to 3.1 inches version should ever have the preference. To vigorous tractions on the trunk he joins expression. In 10 cases, 4 living children, 2 from primiparæ, 2 multiparæ, in whom at previous labors, delivery by forceps had been successful. There was always depression of the parietals."

Alexander Milne uses version, but combined with induction of premature labor. Six women, with pelves ranging from 2.3 to 2.9 inches, had been delivered of 12 children, 11 of whom had died during extraction by forceps or craniotomy. In all the succeeding pregnancies, Milne induced labor and performed version. In 38 instances he obtained 35 living children, 7 of whom died in infancy, the lot of 11 being unknown, and 17 reached adult age.

Budin, Ruge, and Matthews Duncan, have experimented on the head of the fœtus before and at term, in regard to its compressibility, the force which may safely be exerted in traction, and the lesions which may result. Champetier de Ribes has lately made new experiments in the same direction, and we may resume his studies and conclusions, as follows:

1. *Mechanism of the Descent of the Head.*—If, in a pelvis contracted in the conjugate, the head be left at the superior strait after the extraction of the trunk and the shoulders, it assumes ordinarily, a transverse position. The base of the skull, although almost incompressible, may engage, without the influence of much force, in an opening smaller than itself, the posterior portion of the head resting on the bodies of the vertebræ above the promontory—the posterior border of the head descending first, instead of last, as it does in case of easy engagement. When the head descends either spontaneously, or in obedience to traction, it flexes, as Budin has pointed out, and the occiput rises. As this flexion occurs, its posterior portion moulds itself on the

Application of Forceps in Deformed Pelves.

	No. of Cases.	Infants.		Mothers.		Mortality, per cent.		Morbidity of Mothers.
		Living.	Dead.	Recover'd	Died.	Mothers.	Infants.	
Not difficult forceps	95	93	2	94	1	1%	2%	
Difficult forceps,	65	59	6	65			9%	12.3%
Pelves contracted to 1st degree, .	21	16	5	24			23%	33.33%
Pelves contracted to 2d degree, .	29	8	21	26	3	10%	73.5%	65.5%
Pelves contracted to 3d degree, .	8		8	4	4	50%	100%	12.5%

Version and Extraction.

	Cases.	Infants.		Mothers.		Mortality, per cent.		Morbidity per cent.
		Living.	Dead.	Recover'd	Died.	Mothers.	Infants.	
Versions taken together	93	56	37	90	3	3.2	40	7.5
Shoulder presentation,	56	31	25	55	1	1.8	44.6	9
Vertex presentation,	37	25	12	35	2	5.4	32.5	54
			Deformed pelves.					
Shoulder presentation,	5	2	3	5			60	20
Cephalic end, . . .	27	17	10	26	1	3.7	37	7.4
Pelves of 1st and 2d degrees, ...	20	17	3	20			15	

Comparative Table of Forceps and Version. Pelves large enough to permit Extraction of Non-mutilated Fœtus.

Forceps and Version.		No. Cases.	Infants.		Mothers.		Mortality per cent.		Morbidity of Mothers.
			Living.	Dead.	Recover'd	Died.	Mothers.	Infants.	
Forceps	Pelves 1st degree.	21	16	5	21			23.5	33.3
	Pelves 2d degree.	24	8	16	21	3	12.5	66.6	58.2
	Total, .	45	24	21	42	3	6.7	46 5	46.6
Version & Extraction		20	17	3	20	1		15	

part of the pelvis in contact with it, and the fronto-parietal suture approaches the median line, or else the borders of the parietal or the frontal bone, which limit this suture. In addition to this flexion and displacement, the head turns on its axis, so that the occiput is brought in front or behind the corresponding extremity of the transverse diameter of the pelvis. According as the head is large or small, the occiput will rotate backward or forward. The posterior parietal protuberance is stopped behind above the ala of the promontory. If traction be made, the head is found to incline from behind forward. While the posterior portion remains motionless, the anterior describes the arc of a circle; the anterior parietal protuberance, which is on a higher level than the posterior, descends and passes by the superior strait. The cheek, which has cleared this same strait, is applied closely to the sacral concavity, and the posterior parietal protuberance descends either directly or else along the sacro-iliac synchondrosis. The end of the rotation movement brings the occiput behind the symphysis.

The above description applies only to moderately contracted pelves. When the narrowing is considerable, extraction is not possible.

In the asymmetrical pelvis, traction should be made in such a manner as to direct the occiput towards the widest pelvic half.

2. *Relative Value of the Different Means employed to bring the Head into the Cavity.*—The efficacy of flexion is indubitable. Traction on the neck and the lower extremities should, at the outset, be directed a little forward, and later, when the head is well flexed, backward, in order to disengage the anterior parietal protuberance. As for expression, it is only useful when it is made in the axis of the superior strait, and applied to the frontal region. It thus favors flexion and descent.

3. *The Force employed, the Lesions produced, the Results obtained.*—Fifteen times out of thirty-four, the head, at term, was brought through pelves measuring 2.9 inches by the use of a force varying from 45 to 66 pounds. In a pelvis of 2.6 inches, 5 times the head was extracted by a force of 66 to 121 pounds, and 6 times it could not be moved, although a force of 176 pounds was applied. Before term the maximum force used was 55 pounds. As for the lesions, in all the cases before term except one, the parietals were fractured; at term, the same, whenever the traction force exceeded 89 pounds. The maxillary bones were fractured in the fœtus at term whenever the force exceeded 55 pounds; before term

when it exceeded 46 pounds. Lesions of the vertebral column, before term, at 88 pounds, at term 110 pounds.

Scanzoni, out of 10,557 women delivered at the Wurzbourg Maternity, from 1850 to 1881, found 198 with pelvic contractions. The following were the measurement in 194 of these cases:

Dimensions of the conjugate	1.56 inches,	1 case
	2.34 to 2.54 inches,	3 cases
	2.54 to 2.7 “	6 “
	2.7 to 2.9 “	9 “
	2.9 to 3.1 “	11 “
	3.1 to 3.3 “	38 “
	3.3 to 3.5	15 “
	3.5 to 3.7	49 “
	3.7 to 3.9.	52 “
	3.9 to 4.1	10 “

In the four remaining cases, two were scoliotic obliquely contracted, one kyphotic transversely contracted, one coxalgic. Of the 198 cases:

Mothers saved,	91.4 per cent.
Infants “	65 “
Mothers died,	8.5 “
Infants “	31 “

Of the 17 mothers who died, in 11 the cause was sepsis in the 6 remaining, 2 of pulmonary œdema, and one each of inanition, rupture of uterus, post-partum hemorrhage, puerperal mania.

In delivery, the forceps was used 38 times, and version 13. In 47.4 per cent. of the cases, delivery was spontaneous with a maternal mortality of 4.2 per cent; in 52.5 per cent. delivery was instrumental (including forceps, version, etc.), and the maternal mortality was 10.5 per cent., of the infants born spontaneously, the mortality was 19.1 per cent.; of those extracted instrumentally (including the induction of premature labor) 61 infants died.

To compare the figures obtained by forceps and by version:

	Forceps.	Version.
Mothers saved,	94.7 per cent.	85.7 per cent.
“ died,	5.3 “	15. “
Infants saved,	65.8 “	31. “
“ died,	34.2 “	69. “

Scanzoni adds: “If we were, in general, to admit that, in cases of contracted pelvis, version is preferable to the forceps, it should always be resorted to at a relatively early period of labor, while the head is still freely movable. Now, in private practice, we are often called to our patient too late for version, and we must also remember that if we resort to version early, we may be unable to terminate delivery, in cases where often this will occur spontaneously when at first sight it seems impossible." He strongly favors, then, forceps to version, and says that where too great traction is requisite, perforation and cephalotripsy should be resorted to. Faithful to this opinion, in 198 cases of pelvic contraction he resorted to perforation 19 times. In 68.4 per cent. the mothers recovered, and in 31.5 per cent. they died.

[The practice of American accoucheurs in this connection is by no means settled. The general impression would appear to be that it is easier to pull the after-coming head through the contracted brim, than to bring the before-coming head down by the forceps. In other words, where the head is movable above the brim, or just engaged and the membranes not too long ruptured, version, we believe, offers a better chance to the child, and is less likely to damage the mother. In our own experience of the two operations, version and high forceps, the former is far easier of application under the conditions just outlined. We believe with Lusk, that the real intent of version is to save the life of the child, and that it is indicated, in particular, in contracted pelves "only where the child's heart beats with nearly unimpaired vigor, and in pelves measuring between two and three quarters and three and a half inches antero-posteriorly, with the contraction limited to the brim, and with sufficient amplitude in the transverse diameter." (Lusk.)

As for the high forceps, we cannot do better than refer to the carefully prepared article published by Dr. Harold Williams, of Boston, in the Am. Journ. of Obstetrics, January, 1879. In 119 cases of high forceps, about 40 per cent. of the mothers, and 60 per cent. of the infants died. No one will question but that version will give far better results for the mother, and certainly for the child, if performed in time, and this is the *sine qua non.*—Ed.]

We see then that the reasons given by different authorities in justification of their preference are practically identical. The capital deduction is: In order that the head may pass the contraction, whether before- or after-coming, it must flex, and the parietal protuberances must lie to one side of the promontory, in the groove between it and the sacro-iliac

TRANSVERSE CONTRACTION OF INFERIOR STRAIT.

(Double Oblique Oval Pelvis.)

Cases.	Name of Observer.	Degree of Contraction.	Volume of Fœtus.	Operations.	Result.		Observations.
					Mother.	Child.	
1	G. Robert, (autopsy).	1.8 in.	Term.	Cesarean section.	Dead.	Dead.	Shoulder
2	H. Robert, (autopsy).	2.3 "				Living.	Conjugate of brim .39.
3	Lambl, (Seyfert,) (autopsy.)	2.1 "	36th week.	Forceps, cranioclasty, cephalotripsy.		Dead.	Vertex.
4	Spaeth, (autopsy).	2.7 "	Term.	Forceps.			
5	Frickhoffer.	3.2 "		Craniotomy, cephalotripsy.	Recovery.		
6	Hubner, (autopsy).	3.2 "	35th to 36th week.	Induced premature labor, version, perforation of after-coming head.	Dead.		Incomplete pelvic extremity.
7	Kirckhoffer.	1.05 "	Term.	Cesarean section.		Living.	
8	Grenser.	2.3 "		Craniotomy and Cephalotripsy.	Recovery.	Dead.	Necrosis of right Ischium.
9.	Dupuytren. Depaul. Tramont.	1.8 " 2 " 2.2 "					Museum specimens.

KYPHOTIC PELVES.

(*Contraction of Transverse Diameter of Brim.*)

Cases.	Name of Observer.	Degree of Contraction.	Volume of Fœtus.	Operations.	Result.		Observations.
					Mother.	Child.	
1	Moor, (Zurich), (autopsy.)	1.8 in. to 2.5 in.	Term.	Forceps.	Recovery.	Living.	Vertex.
			35th week.	Induced premature labor.		Dead.	Feet.
			Term.			Living.	Face.
			7 to 7¼ months.		Dead.	Dead.	Brow.
2	Schmeidler, (Breslau).	1.9 "	Term.	Perforation.	Recovery.		Vertex.
3	Birnbaum.		Term.	Forceps.			Vertex, occiput posterior fracture of parietal.
							Vertex, O.L.A. (fissure of parietal.)
4	Hugenburger, (autopsy).	3.3 "	Term.			Living.	
			Term.	Forceps.			O.L.P.
			Term.		Dead.		
5	Bailly.	6.8 "	6½ months.	Induced miscarriage.	Recovery.	Dead.	Vertex.
							Breech.
			7 months.	Premature labor, induced.			Vertex.
6	Jenny, (Lucerne), (autopsy.)	3.5 "	Term.	Ces. section.	Dead.	Living.	Uniformly contracted.
7	Depaul.		6 4-5 lbs.	Forceps.	Recovery.		

synchondrosis, so that the bi-temporal, or a neighboring diameter, may substitute itself for the bi-parietal. Spontaneous termination, or by forceps, or by version, is only possible on this one condition. As for the choice of method, the experiments of Budin and of Champetier should to-day be our guide: Whenever the woman is at term, the forceps; before term, version. The future, however, must decide the question.

Prognosis.—The greater the contraction, the larger the infant, the graver the prognosis. The most common form of contraction, the rachitic, gives the best results; the osteomalacic, and the funnel-shaped pelves, give the worst results. The preceding tables, from Chantreuil and Choisil, (see pages 136, 137), show the gravity in case of the kyphotic and kypho-scolio-rachitic forms.

ETIOLOGY AND TREATMENT OF CONTRACTED PELVES.

Rickets is the disease which most frequently causes pelvic deformity. We may avoid this deformity in a measure then by causing rachitic children to retain a horizontal position so long as the bones are soft, pliable, and likely to bend.

The treatment is essentially based on the degree of contraction, and we must, therefore, at the outset, obtain an exact idea of this degree through mensuration. We must further endeavor to ascertain the cause of the deformity, the correct period of gestation, and the volume, position, presentation, mobility, viability of the fœtus. When labor has once begun, we should remember that the duration is always greater than in case of the normal pelvis, and we must never interfere unless this duration seems prejudicial to the mother or to the child. We should carefully, on the other hand, time our interference before the mother or the fœtus becomes too greatly exhausted. The woman had better lie down from the outset, since premature rupture of the membranes is likely to occur, and, in consequence, prolapse of the limbs and of the cord. When the pains are feeble, and the head, at the superior strait, has but little tendency to engage, we do not hesitate at the end of about twelve hours to rupture the membranes, but always in the intervals of the contractions, and with the precaution of allowing the liquor amnii to flow out but slowly. We thus obtain fixation of the head, and the pains increasing in intensity the head engages more or less according to the degree of contraction, and the size of the fœtus. If the head do not engage, then, after waiting a reasonable length of time, we must interfere, and the point is to choose the method. We have seen that abroad preference is given to version, and in France to the forceps, followed if need be by perforation. The recent experiments of Budin, Duncan, Milne and Champetier, would, however, seem to modify this practice, in that version is preferable before term and the forceps after. In case of transverse presentation at term, the endeavor should be made to bring the head by external manipulation over the superior strait, and similarly in case of presentation of the pelvic extremity. But if the woman is not at term, should we interfere with a cephalic presentation by conversion into the breech by external manipulation, or, as Milne advises, induce labor and perform internal version? To induce labor is certainly our duty, but as to our second course of action this is a point which the future must decide. Finally, if the child present by the shoulder what should we do? Bring the head, by external version to the superior strait, or await complete dilatation and then perform internal version? Here again it is impossible as yet to dogmatize.

Such are the general rules of treatment which we would lay down. We must now consider the special indications according to the degree of pelvic contraction.

1. The pelvis measures at least 3.5 inches in the conjugate.—*a.* The woman is at or near term. If the vertex presents wait as long as the condition of the mother and child will allow, and then apply the forceps. If the face presents, the indication will vary according as the chin is before or behind. In the former event, wait as long as possible, and then apply the forceps; in the latter event authorities are not in agreement. We must at the outset endeavor to transform the face into vertex by promoting flexion; but if this do not succeed ought we to turn or to apply the forceps? The forceps necessitates artificial rotation of the head in order to bring the chin forwards, but we have seen that, in a general way, version at term is less advantageous, and therefore we pronounce for the forceps, always provided that prolonged attempts at extraction are not made. If the pelvic extremity present, version by external manipulation to bring the vertex to the superior strait, and then the forceps. In case of the shoulder, external version, and, if this fail, internal, followed at once by the forceps to the after-coming head. *b.* Where pregnancy has not reached term delivery will always terminate spontaneously, and

we would only induce premature labor at 8½ months in case the fœtus was of excessive size or the mother had had difficulty in previous labors.

2. The pelvis measures between 3.5 and 2.3 inches in the conjugate.

A. At or near term. Here there are two subdivisions: *a*. The fœtus is dead. In case of presentation of the vertex or the face, we should wait until dilatation is sufficient, rupture the membranes, and perforate. Then wait for complete dilatation, and if the head still does not descend, apply Bailly's cephalotribe and extract. In case the pelvic extremity presents, we should perform external version, and then proceed similarly. If external version fails, deliver the trunk and perforate the after-coming head. If the shoulder presents, external version; if this fail, internal version, perforation, and extraction; decapitation if version is not possible. *b*. In case the child is alive, a further sub-division is necessary. *c*. The pelvis measures between 3.5 and 2.9 inches. In case of the vertex, the forceps should be tried, as also in case of the face, but traction should not be prolonged, and the fœtus mutilated rather than injure the mother by ineffectual attempts at delivery. The pelvic extremity and shoulder also call for rapid intervention. *d*. Pelvis measuring from 2.9 to 2.3 inches. Here the interests of the mother are best served, as the lower limit is approached by resorting to mutilation of the fœtus. Depaul favors the Cæsarean section at 2.3 inches, but we can neither grant this, nor above all the Porro which deprives the woman at once of the chance of future delivery by resort to timely premature labor. We would await the death of the child, but we believe it should be the rule in these instances to make up our minds to the sacrifice of the fœtus, and that we should tell our patient that the induction of premature labor at her next pregnancy offers a chance of a living child.

B. The woman is not a term. There are a number of means at our disposal. Depaul advocates debilitating measures and repeated venesection, and was thus able to obtain living fœtuses at the eighth month in pelves measuring 3.12 inches. Others have advised the administration of the iodide of potass. The capital method, however, is the induction of premature labor, sooner or later according to the degree of contraction. If labor is induced, must we resort to forceps or to version? Champetier's researches and conclusions speak entirely in favor of the latter.

3. The pelvis measures from 2.3 inches and below. If the woman is at

term we must distinguish the cases where the infant is alive or dead, and where the pelvis measures at least 1.5 inches, or below.

If the infant is dead and the measurement is at least 1.5 inches, we should resort to cephalotripsy. If the child is alive, the choice lies between cephalotripsy and the Cæsarean section. In face of the risks to the mother involved in the Cæsarean section, even as modified by Porro, we would prefer cephalotripsy and only resort to the former at the express request of the mother. Below 1.5 inches all authorities are agreed in regard to cephalotripsy in case the infant is dead. If it is alive, the Cæsarean section is the choice of all but Pajot who advocates repeated cephalotripsy without traction even down to one inch contraction.

If the woman is not at term, miscarriage should be induced. Premature labor at seven months would avail nothing, since the fœtus is too developed to pass with ease. Stoltz is about the only authority who advocates allowing the woman to go to term and performing the Cæsarean section.

[The above deductions of Charpentier in regard to treatment will be generally accepted as just. It is, however, a question if in the not distant future these deductions will not suffer considerable modification. Day by day the results obtained from the modified Cæsarean section are being bettered, and those yielded by laparo-elytrotomy will compare very favorably, as regards the mother, with cephalotripsy, even after Pajot's method, in extreme degrees of pelvic deformity. If the time comes when the risk to the mother can be proved to be no greater by timely resort to operations which also consider the life of the fœtus, most assuredly will it be our duty to reject absolutely all mutilating operations in case of a living child, other conditions necessary for the successful section, or laparo-elytrotomy, being present. The latest statistical data of these operations will be found under the subject of obstetric operations.—Ed.]

We must now consider the proper course of action in case of deformity the result of other than rachitic cause. In osteomalacia the treatment is absolutely subordinated, not only to the degree of contraction, but also to the quality, so to speak, of the pelvic bones. We have seen that in one of the osteomalacic forms, the bones are so soft and supple that they may distend enough to allow the at first sight impossible delivery. The customary procedure in these cases is version. These cases are exceptional, although proved possible by the instances recorded by Kilian, Robert, Olshausen, Hugenberger, Winckel, etc.

In the generally and regularly contracted pelvis, the vertex presentation is the most favorable of all, and version is absolutely contra-indicated. Forceps are required, and in case of failure, perforation and cephalotripsy.

In the oblique oval pelvis version is the most rational operation, the object being to bring the head into the widest part of the pelvis.

In kyphotic pelves, perforation and cephalotripsy; in the spondylolisthetic and spondylizematic pelves, miscarriage before term, the Cæsarean section at term; in pelves deformed from congenital luxation, with lordosis or scoliosis, ordinarily labor at term is possible, and rarely is mutilation requisite. Finally, in the pelves deformed by the presence of a tumor, all depends on its nature. If fluid, puncture; if solid, it is impossible to lay down fixed rules. In certain cases miscarriage, in others premature labor, in still others the Cæsarean section, embryotomy, cephalotripsy, and finally in others even version or the forceps are called for.

We must never forget the fact noted by Ahlfeld and Simpson, that with successive pregnancies the fœtuses increase in size, and that hence a moderate contraction, allowing ready delivery at the first pregnancies, may call for operative interference in the later.

DYSTOCIA OWING TO THE CONDITION OF THE SOFT PARTS.

Contraction and Rigidity of the Vulva and Vagina.—In women who become pregnant late in life, or possess strong muscular development, the external genitals may be rigid and resist dilatation, thus retarding the progress of labor. The head succeeds in overcoming the obstacle only after violent efforts, and often after tearing the vulva and perineum. Budin has shown that the resistance is really not at the vulvar cleft, but at the lower extremity of the vagina. Olshausen has demonstrated the resistance offered by the *constrictor cunni*. The vulvo-vaginal opening may in some instances furnish an obstacle to delivery, but Budin believes that it is at the vaginal orifice, as he proved in a case where the head had been arrested for two hours at the vulva, and was delivered in a few seconds after incising the edge of the vaginal outlet. The latter only yields by tearing, and this occurs constantly at the first labor; the laceration occurring at several points, one being in the median line posteriorly, and one or more on each side. The former may extend to the *fourchette*, and then involve the perineum, and is caused by the passage of either the head or the shoulders. But the resistance and narrowness of the vulvar opening may constitute the real difficulty, and if the resistance is extreme, and the perineum is excessively thinned and distended, a central rupture may occur. It is in such cases that incision of the vulvar cleft has been recommended, and authorities differ as to the point at which it should be made, Michaelis preferring the median line, while others make two lateral incisions with the scissors or bistoury, the depth of which should not exceed ¼ of an inch. Tarnier urges the following objections to lateral incisions: A large gaping wound is left on either side of the vulva, the edges of which cannot unite by first intention, and the result is long suppuration and cicatricial contraction. In a certain proportion of the cases the incisions do not prevent extensive laceration of the perineum. Tarnier recommends an incision beginning at the median raphé, and extending, not directly backwards, but obliquely outwards towards the anus. If rupture of the perineum occurs in spite of this, it will follow the direction of the incision, and the sphincter will be saved.

Resistance and Laceration of the Perineum.—Resistance of the perineum, especially in occipito-posterior positions with non-rotation, is unquestionably the most frequent cause of dystocia in primiparæ, and is due either to too vigorous contraction of the muscles that constitute the perineum, or to excess of adipose tissue in it. Two results may occur: Either the contractions of the uterus, which are at first exaggerated by reason of the resistance, gradually diminish in intensity, until the organ sinks into a condition of more or less complete atony, or, on the other hand, the pains continue to increase until rupture of the uterus or death of the fœtus results; again, the head may be driven through the perineum, causing a central rupture. It is not by any means the thinnest perinea that are most liable to tear, but those in which the tissues are soft and œdematous. Whether the pains are weak or strong, says Cazeaux, *we must absolutely proscribe ergot*, and have recourse to the forceps. Kristeller's method of expression is sometimes of value. Lacerations may be complete, incomplete, or central.

Frequency.—These are far more frequent than is generally admitted. As Cohen and Budin have shown, many lacerations extend from within outwards, the mucous membrane tearing first, then the muscles and fascia, and lastly the skin. Olshausen distinguishes two varieties, those which are inevitable, occurring in spite of the greatest precaution, and those which are avoidable. The first (not including tears of the *fourchette,*) occur in 15 per cent. of primiparæ. The result of his observations, extending over ten years, shows that the perineum is torn in 21.1 per cent. of primiparæ, and in 4.7 per cent. in multiparæ. Snow Beck saw 75 ruptures in 112 primiparæ, Schroeder 71 in 189 primiparæ, but only 9 in 100 multiparæ.

The following table, prepared by Schrenck, gives an idea of the frequency of rupture of the perineum.

	Cases.	Proportion of Lacerations.	Frequency.	
			Primiparæ.	Multiparæ.
Hildebrandt, ...	356	7.2%	19.7	.18%
Nippold, ...	1011	11.5%	18.7	2.2%
Olshausen, ...	119		21.1—4.7%	4.7%
Liebmann, ...	1064	15.9%	30%	4.2%
Mewis, ...	1095	19.8%	31.8%	5.8%
Winckel, ...		20%		
Schrenck, ...	847	21.4%	36.6%	8%
Fasbender, ...	300	22.3	34%	10.6%
Schroeder, ...	289	27.7%	34.5—37.6%	9%
Litzmann, ...		27.6		

Causes.—Schrenck mentions as causes too slight inclination of the pelvis, delivery in the dorsal position, want of experience on the part of the physicians or students who preside over the delivery. There are other more important factors, such as non-rotation of the head, rapid delivery with the forceps before the perineum has had time to dilate, or violent straining efforts on the part of the woman after the birth of the head. The slipping of the forceps is another cause, also the use of the cranioclast, the introduction of the hand, etc. There are, as Pajot says, some perinea that are bound to tear, especially such as are thick, narrow, and infiltrated, or œdematous. The tear may involve the *fourchette* only, a portion of the perineum, the edge of the sphincter, or the entire sphincter, and more or less of the recto-vaginal septum. As long as it does not extend entirely through the sphincter, it may be regarded as incomplete

Finally, the sphincter and commissure may remain, while the centre of the perineum is perforated, sometimes sufficiently to allow of the passage of the child. Among 181 cases of ruptured perineum, Schrenck has noted 134 of the first degree, 41 of the second, and 1 of the third. Central rupture is rare; Morand (1869) collected 38 cases, in two of which forceps were applied to the non-rotated head. These tears generally heal readily, though in some instances a permanent fistula may remain. Lacerations through the sphincter are followed by serious consequences, the partition between the rectum and vagina being removed, so that the two canals form a true cloaca; gas and feces are passed involuntarily and the woman's condition is deplorable; the support of the vaginal wall being destroyed, prolapse of the same, as well as cystocele and prolapsus uteri, result.

Treatment.—This is prophylactic and curative.

1. *Prophylaxis.*—This consists in preventing the tear, or at least in limiting it to an incomplete rupture. The oldest method consists in supporting the perineum; to that end the palm of the hand was applied to the perineum, with the thumb on one side of the vulva, and the fingers on the other; but this did not always prevent rupture, since, although the head was indirectly supported, its rapid expulsion was not hindered. Hence we have now abandoned this method, and endeavor to apply force directly to the head, retarding its progress so that the perineum may gradually become distended. Some authorities press directly upon the head, others indirectly, or through the anterior portion of the perineum. Depaul applies pressure to both the head and the anterior commissure, the former being thus kept at the edge of the vulvo-vaginal outlet, until the perineum is gradually distended, thus avoiding a complete laceration. Hohl, in addition to retarding the head, advises making an attempt to increase its flexion by pushing up the occiput; this he also does during the intervals of traction with the forceps. Olshausen thinks that this manœuvre is of slight value. Alt and Schroeder have advised placing the woman in the knee-elbow position, in order that gravity may assist in keeping the head under the pubic arch. The former writer states that in 100 women delivered in this posture the frenum was intact in 50, and that only 25 had actual lacerations. Since it was almost impossible to make patients assume this position, the lateral was substituted for it. Olshausen supports the perineum with one hand, with the woman on her

side, while with the four fingers of the other he supports and opposes the advance of the head. He does not use chloroform at this stage, because, in order to obtain complete relaxation of the abdominal muscles, it would be necessary to produce too profound anæsthesia; it is better, he thinks, to utilize the muscular contractions, rather than to eliminate them, in producing gradual distension of the perineum. He also recommends the introduction of two fingers into the rectum, so as to make pressure on the brow, while the thumb is pressed against the head at the anterior commissure; in this way too rapid expulsion can be prevented and a threatening tear be avoided, the head being slowly rolled out until it is entirely disengaged. Goodell describes a similar manœuvre, but his object is to act, not upon the head, but upon the ano-perineal border, by drawing the entire perineum forwards, and thus relieving the tension upon it. Hunt raises the objection, very properly, that we thus defeat our own object, because in thus drawing the perineum forwards, we increase the chances of rupture; the perineum ought rather to be drawn backwards, so as to carry the vulvar cleft in the direction of the expulsive force, and thus to diminish the muscular resistance of the posterior half. It is better, when rupture is imminent, to perform episiotomy, or to incise the constrictor cunni. Simpson and Cohen have even advised sub-mucous division of the muscle. Olshausen does not believe that the use of the forceps prevents rupture, since in 244 cases in which they were applied in the Halle Clinic, there were 76 lacerations, 36 being in primiparæ, or one per cent., while in spontaneous delivery the average was only six per cent.

[The best way to prevent laceration of the perineum, is to prevent rapid termination of the second stage, and thus give the muscles an opportunity to relax. As soon as the head reaches the perineal floor, it is to be carefully watched by the accoucheur, its advance being regulated by the fingers and flexion being maintained. When relaxation seems sufficient, administer chloroform to the surgical degree, and then, in the intervals between the pains, shell out the head, as it were. In this way the head will be prevented from tearing the perineum, and neither the shoulders nor the hips ought to do so. A point to be remembered is: After the completion of labor, not only look at the perineum, but test its integrity by the fingers. If this rule be followed, the statement will no longer be heard, as it frequently is—"In an extensive practice laceration of the perineum has never occurred."—Ed.]

2. *Curative Treatment.*—In lacerations of the first degree, involving only the frenulum, or the anterior part of the perineum, no operative treatment is necessary. In those of the second degree, most writers advise immediate coaptation of the raw surfaces, by means of serre-fines or sutures. We believe that these are unnecessary, since, as long s the sphincter is uninjured, primary union (at least of the posterior art of the wound) is the rule. Sutures and serre-fines are painful, an often become relaxed and displaced, while the same result is just as goo if the limbs are simply approximated. The following is the treatment which we confine ourselves: After carefully cleansing the wound, we ace the woman on her back, and apply over the perineum a compres et in a one-per-cent. solution of carbolic acid, and tie the legs to her, the bowels being constipated with opium. The patient retains e dorsal posture for forty-eight hours, her urine being drawn, or pass n a bed-pan. The parts are washed with the carbolic acid solution, out four times in the twenty-four hours, a stream of water being all d to fall upon them. After forty-eight hours the wound is examine e patient being turned on her side. On the fourth day the bowels ar oved with castor oil. In this way primary union is nearly always obt l.

Surgical intervention is nearly always necessary in compl cerations, since cases of spontaneous cure are rare. Shall we operat mediately, wait (with Nélaton) until the eighth or twelfth day, or unti ral months shall have elapsed? We are strongly in favor of the la alternative. Primary perineorrhaphy rarely succeeds; it is true that t und is fresh and denudation is unnecessary, but, aside from the fac the lochial discharge often prevents union, we must not forget tha perineum is not merely torn, but is contused and mangled, and t e previously œdematous and infiltrated tissues are predisposed to ga e, and consequently are in the worst possible condition for imme nion. Nélaton's method consists in trying to obtain union by intention, by approximating the raw surfaces by means of deep an ficial sutures, without denuding; this has been successful in a few It is better to wait until after the expiration of five or six mont must not forget that involution of the genital organs is not con until the end of the third month, and there is no advantage in o sooner.

side, while with the four fingers of the other he supports and opposes the advance of the head. He does not use chloroform at this stage, because, in order to obtain complete relaxation of the abdominal muscles, it would be necessary to produce too profound anæsthesia; it is better, he thinks, to utilize the muscular contractions, rather than to eliminate them, in producing gradual distension of the perineum. He also recommends the introduction of two fingers into the rectum, so as to make pressure on the brow, while the thumb is pressed against the head at the anterior commissure; in this way too rapid expulsion can be prevented and a threatening tear be avoided, the head being slowly rolled out until it is entirely disengaged. Goodell describes a similar manœuvre, but his object is to act, not upon the head, but upon the ano-perineal border, by drawing the entire perineum forwards, and thus relieving the tension upon it. Hunt raises the objection, very properly, that we thus defeat our own object, because in thus drawing the perineum forwards, we increase the chances of rupture; the perineum ought rather to be drawn backwards, so as to carry the vulvar cleft in the direction of the expulsive force, and thus to diminish the muscular resistance of the posterior half. It is better, when rupture is imminent, to perform episiotomy, or to incise the constrictor cunni. Simpson and Cohen have even advised sub-mucous division of the muscle. Olshausen does not believe that the use of the forceps prevents rupture, since in 244 cases in which they were applied in the Halle Clinic, there were 76 lacerations, 36 being in primiparæ, or one per cent., while in spontaneous delivery the average was only six per cent.

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Surgical intervention is nearly always necessary in complete lacerations, since cases of spontaneous cure are rare. Shall we operate immediately, wait (with Nélaton) until the eighth or twelfth day, or until several months shall have elapsed? We are strongly in favor of the latter alternative. Primary perineorrhaphy rarely succeeds; it is true that the wound is fresh and denudation is unnecessary, but, aside from the fact that the lochial discharge often prevents union, we must not forget that the perineum is not merely torn, but is contused and mangled, and that the previously œdematous and infiltrated tissues are predisposed to gangrene, and consequently are in the worst possible condition for immediate union. Nélaton's method consists in trying to obtain union by second intention, by approximating the raw surfaces by means of deep and superficial sutures, without denuding; this has been successful in a few cases. It is better to wait until after the expiration of five or six months; we must not forget that involution of the genital organs is not completed until the end of the third month, and there is no advantage in operating sooner.

[We are obliged to differ *in toto* from Charpentier. We would maintain that any laceration beyond the first degree should be immediately repaired, for the reason that thus a possible entrance site for septic matter is prevented, and also because the operation is a simple affair after delivery, and more complicated and extensive the longer we wait. Tying the legs together is an utterly useless procedure, as any one may prove by placing the woman in the dorsal posture, and separating her legs as much as he wishes, when he will find that the perineum is not stretched at all.

Thepain involved in the immediate operation is nothing to speak of; indeed ordinarily, it may be performed while the patient is still under the influence of chloroform. Further, if the operation is carefully performed, primary union, in our experience, is certainly the rule.

In case of laceration to the second degree only, one deep silk or wire suture, as recommended by Alloway, of Montreal, will amply suffice. If the rent be deeper, three to five sutures should be used. In any event, the patient should be placed on her side, a wad of absorbent cotton inserted into the vagina to catch the discharges, the wound carefully washed and trimmed of jagged shreds, and then, guided by the finger in the rectum, the suture is passed deeply around, at ½ inch from the margins. The large curved needle, recommended by Mundé, answers admirably. The line of suture should be dusted with iodoform, and a narrow strip of cotton laid along the perineum and the posterior vaginal wall. The after treatment will consist in dusting with iodoform twice daily, and replacing the strip of cotton by a fresh piece, till the sixth or seventh day, when the sutures may be removed.—Ed.]

In connection with lacerations of the perineum, other lesions of the external genitals should be mentioned, and these are innumerable. Sometimes they are confined to the vagina, sometimes to the nymphæ, or the upper part of the vulva; they may be attended with profuse hemorrhage. Schroeder has noted seven cases of laceration in the vicinity of the clitoris, accompanied by much bleeding. The lateral incisions, made to prevent rupture of the perineum, may bleed freely; once we saw a small artery severed which required ligature. It is usually sufficient to apply to the bleeding parts a compress moistened in a solution of perchloride of iron.

MALFORMATION OF THE GENITAL ORGANS.

As Schroeder properly says, the only malformations of the female genital organs that interest the obstetrician, are those which do not interfere with pregnancy. Now, conception is possible whenever normal ova are expelled from the ovary, and when the canal traversed by the ovum or the spermatozoa, from the ovary down to the vaginal outlet, is at no point absolutely impermeable.

I. *Malformations of the Uterus.*

Modern researches in embryology have shown that the genital organs are formed at the expense of the Wolffian body and its excretory canals, and Müller's ducts, the latter being transformed into the uterus and Fallopian tubes. Geoffroy Saint-Hilaire and others showed that there are three stages of development, viz.: 1. Separation and complete division. 2. Approximation and reunion in the median line. 3. Complete fusion.

Thiersch was the first to prove that the uterus and vagina are formed by the fusion of Müller's ducts, the upper portion becoming the tubes, the lower, the uterus and portio vaginalis. The rectum and bladder are eventually separated from the uro-genital canal by an anterior and posterior spur that, later, form the recto- and vesico-vaginal septa. The external genitals are formed, after the internal have become partly developed, by the disappearance of the tissues placed between the rectal cul-de-sac, the vagina and the bladder on one side, and of the integument on the other, the three cavities communicating with the exterior of the body. This explains all the malformations that occur: for example, if the rectal cul-de-sac is not opened, imperforate anus results; if the tissue that closes the vaginal canal is not absorbed, more or less complete obliteration, or even absence, of the vagina is produced.

1. Müller's ducts may remain in contact at their point of entrance into the cloaca, but remain separate above, forming two distinct uterine cavities, each of which has a single tube connected with it; there are thus two uteri, each of which has its cervix, and a single tube and ovary attached to it (*uterus duplex.*)

2. The ducts may unite below, but remain separated above (*uterus bicornis.*)

3. The junction may occur at the normal point, but the fundus may remain undeveloped, having a median cleft which gives to it the appearance of a heart (*uterus cardiformis.*)

4. The ducts, instead of developing, may atrophy, resulting in the complete absence of the internal genital organs; this atrophy may be limited to that portion of the ducts which is destined to form the body of the uterus, the appendages developing normally (*uterus deficiens*), or a single duct may atrophy, resulting in a deficiency of one horn of the uterus (*uterus unicornis.*)

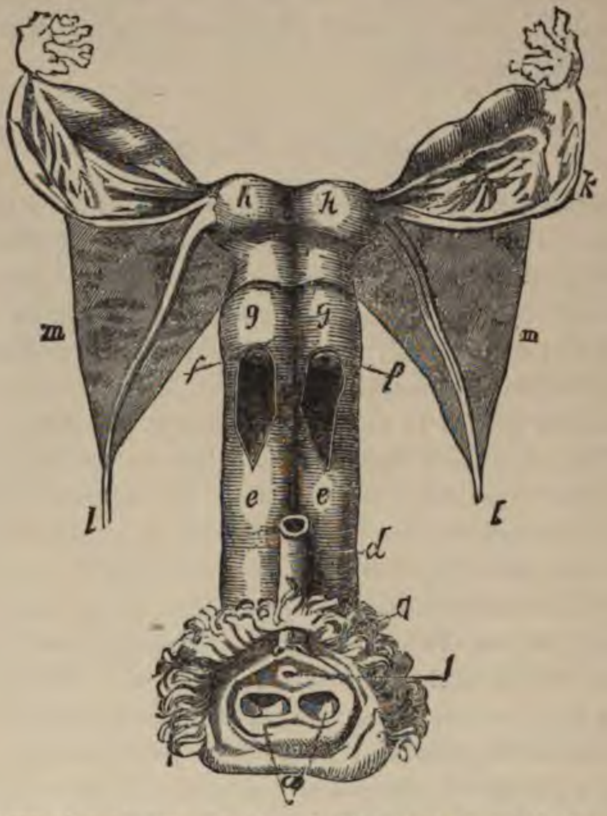


FIG. 130.—UTERUS DUPLEX. (*Eisenmann.*)—*a*, Double orifice of vagina. *b*, Meatus urinarius. *c*, Clitoris. *d*, Urethra. *ee*, Double vagina. *ff*, External orifices. *gg*, Cervices. *hh*, Corpora uteri. *ii*, Ovaries. *kk*, Tubes. *ll*, Round ligaments. *mm*, broad ligaments.

5. The septum which separates the united ducts may persist, so that the uterus contains two distinct cavities (*uterus septus, bilocularis, bi-*

partitus); or, the septum may be absorbed below, but may persist at the fundus (*uterus subseptus, semi-partitus.*)

6. The arrest of development may affect the vagina as well as the uterus, so that the canal may be wholly or partly double, or absent.

It is evident that some of these malformations absolutely prevent conception, but that pregnancy may take place in a one-horned, or double, uterus. Pregnancy may occur either in the well-developed, or in the rudimentary horn, and that too although the neck of the latter is closed (Fig. 131). Schroeder explains this by supposing that the semen has been able to pass up the tube which connects with the well-developed horn, enters the peritoneal cavity, and crosses over to the opposite ovary, where it fecundates the ovum which has been grasped by the tube of the imperfect horn; or a fecundated ovum from the ovary corresponding to the normal cornu may cross to the opposite tube. According to Scanzoni and Schroeder, the course of the pregnancy in this case bears the closest analogy to the extra-uterine variety. The rupture of the fœtal sac, with its fatal consequences, takes place at some time between the third and sixth month, the point at which the rupture occurs being the least developed portion of the horn. The normal horn takes part in the forma-

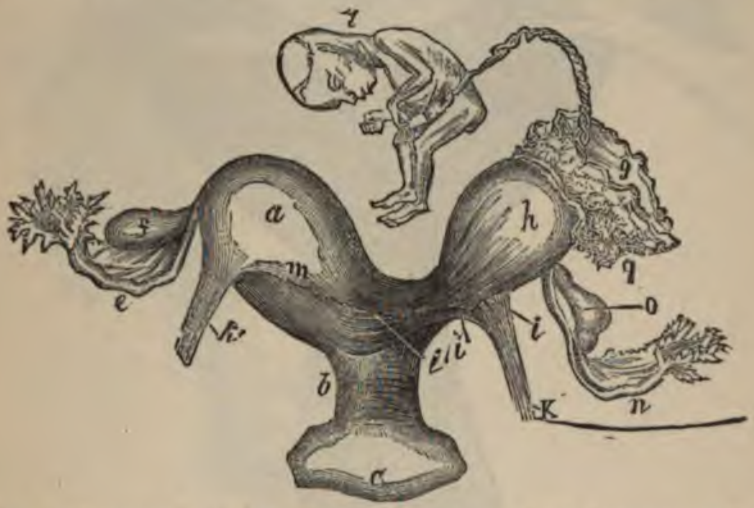


FIG. 131.—PREGNANCY IN A UTERUS BICORNIS, MISTAKEN FOR TUBAL PREGNANCY.—*a*, Uterus. *h*, Rudimentary cornu. *g*, Placenta and membranes. *q*, Placental villi. 2, Fœtus. *iii*, Muscular tissue uniting the cornua. *k*, Round ligament. *n*, Left tube. *o*, Left ovary. *f*, Right ovary. *e*, Right tube. *c*, vagina.

tive activity, as shown by the hypertrophy and softening of the muscular tissue, the development of its vessels, and the growth of a decidua. The fœtus may die and be transformed into a lithopædion. The diagnosis is almost impossible in the living subject, and even in the cadaver it may be mistaken for tubal pregnancy (Fig. 131.)

When pregnancy takes place in the well-developed horn it usually proceeds normally; the uterus has a crescentic form, and by palpation a small tumor has been felt attached to the organ by a short pedicle. The eccentric attachment and abnormal shortness of the portio vaginalis serve to confirm the diagnosis. Gestation may likewise occur in a double uterus, but abortion is more likely to follow. Simultaneous development of a fœtus in each half of the uterus has been observed several times, and this proves that in ordinary twin-pregnancies one ovule may come from each ovary, and not both from a single one. Labor usually proceeds normally, but rupture of the septum, or even of the uterus, may ensue.

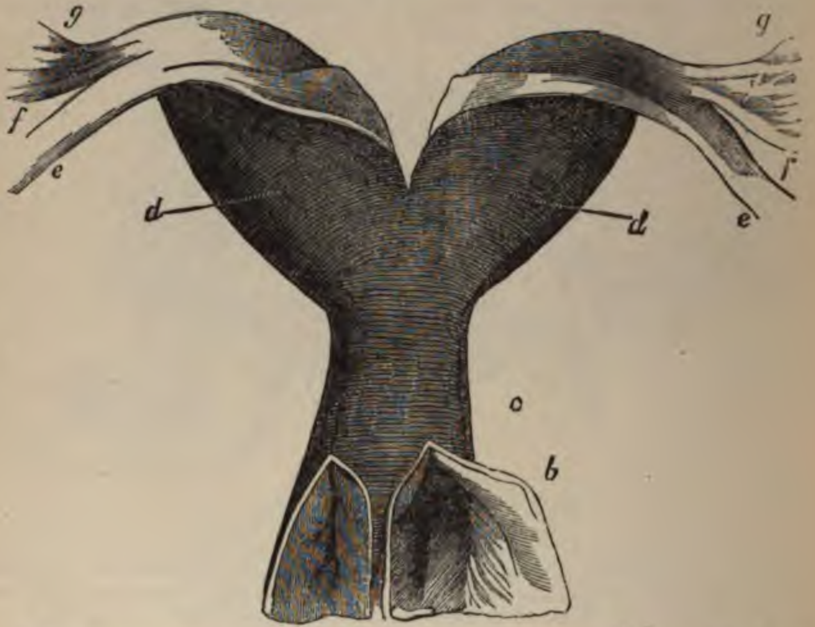


FIG. 132.—UTERUS BICORNIS WITH DOUBLE VAGINA, IN A YOUNG GIRL OF 17.—*a*, Vaginæ. *b*, Os of left uterus. *c*, The two cervices, simulating one. *dd*, The cornua. *ee*, Round ligaments. *ff*, Tubes. *gg*, Ovaries. (*Schroeder*.)

Grinow has collected fifteen cases of pregnancy associated with malformations of the uterus or vagina, two-thirds of the women being primiparæ. Eight reached full term, two nine months. In two instances labor began with hemorrhage, as the placenta was attached to the septum. The uterine contractions were feeble, sometimes spasmodic, so that interference was frequently necessarv. Five of the women died.

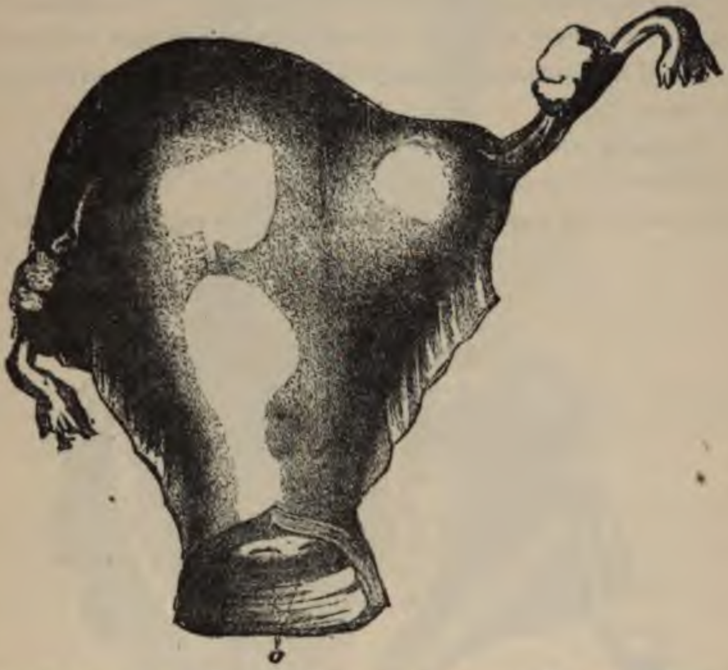


Fig. 133.—Uterus Bipartitus with Double Vagina. (*Cassan.*)—*a*, Orifices of cervix.

II. Malformations of the Vagina.

1. *Abnormal Openings of the Vagina.*—These may be arranged after Nélaton, under the five following varieties: *a*. Imperforate or open vagina, which communicates with the rectum; *b*. Imperforate rectum, opening into the vagina; *c*. Vagina opening into the urethra or bladder; *d*. The

bladder, rectum, and vagina may communicate and open into a true cloaca; *e.* The vagina may open through the anterior abdominal wall.

2. *Division of the Vagina.*

A. *Complete Division, double Vagina.* (Fig. 130).—The uterus may be single, or very rarely a double uterus may communicate with two vaginæ, one of which opens externally, while the other is imperforate at its vulvar extremity.

B. *Congenital Atresia of the Vagina.*

C. *Obliteration of the Vagina.*—Here we must distinguish between imperforate hymen and true obliteration of the vagina; the latter may take place at the vulva, being due to fusion of the nymphæ, or the vagina may be closed by a transverse septum.

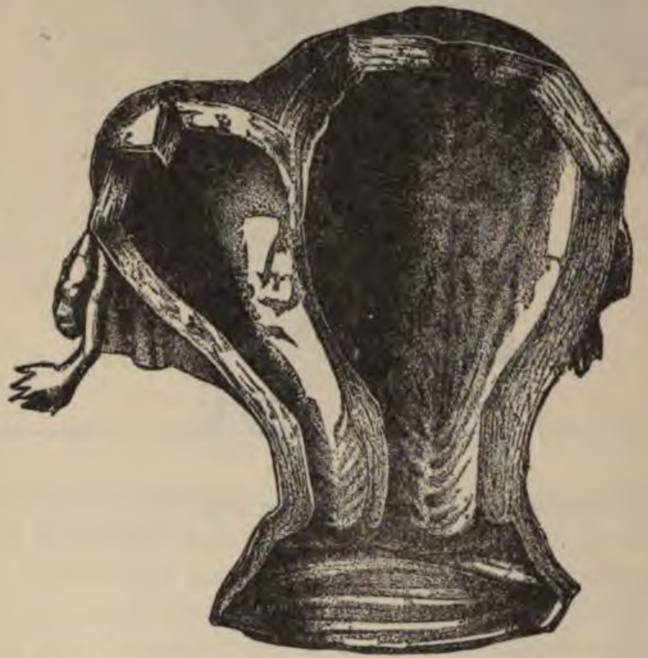


FIG. 134.—UTERUS IN FIG. 133 LAID OPEN TO SHOW THE SEPTUM.

D. *Absence of the Vagina.*—It may be entire or partial, may be limited to the vagina, or may be associated with absence of the uterus.

Three varieties are usually met with, *viz.*: 1. The external genitals are normal, but the uterus and vagina are entirely wanting. 2. There is no external opening to the vagina, but the uterus, and sometimes the portio vaginalis, are intact. 3. The vagina ends in a cul-de-sac, more or less extensive, the uterus being either entirely absent or atrophied. Menstruation is absent.

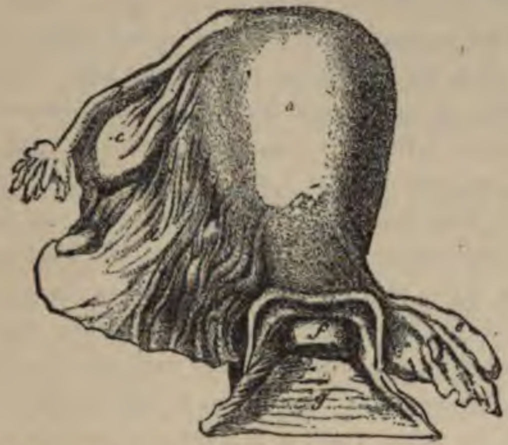


FIG. 135.—UTERUS UNICORNIS OF A 10-PARA, AND IN WHOM THE LEFT KIDNEY WAS ALSO ABSENT. (*Chaussier.*)—*a*, Posterior wall of right, developed side of the uterus. *b*, Right tube. *c*, Right ovary. *d*, Right broad ligament. *e*, Tube, ovary, broad ligament of left side, atrophied. *f*, Vaginal portion of cervix. *g*, Vagina.

III. PERSISTENCE OF THE HYMEN.

Among the defects in original development is one that deserves our attention, because it may not only cause disturbances at the beginning of menstruation, but may give rise to dystocia; we refer to persistent hymen.

The hymen not only may resist the first conjugal approaches, but there are rare cases in which it may be multiple—that is, there are two, or even three, diaphragms at different heights in the canal, as described by Pajot and Nélaton. Sometimes the hymen is so relaxed that it does not rupture until the moment of delivery, when it arrests the head, so that interference is necessary on the part of the attendant. Cicatricial bands are usually due to former labors or caustics; it may be necessary to divide them.

THROMBUS OF THE VULVA AND VAGINA.

Under the name thrombus we designate an extravasation of blood into the cellular tissue surrounding the vulva and vagina. This extravasation may not be limited to these parts, but may extend high up on the abdomen. We are then dealing with a true hemorrhage. This accident is rare, since Deneux, in a practice of forty years, only observed three cases, Dubois three cases in 1,400 deliveries, Winckel one in 1,600, while in our clinic only one case was noted in 1,800. It may occur in the non-pregnant state, but is most common in the pregnant woman after delivery. Extravasations are most common at the vulva, the swelling being unilateral. In the vagina they are usually situated in the lateral and posterior walls, rarely in the anterior. The extravasation begins, as a rule, during labor, but does not actually appear until after delivery. Laborie has shown that the location of the swelling is determined by the anatomical structure of the parts: thus, if it is beneath the skin of the perineal region, it may extend to the thighs or abdomen, but if beneath the superficial fascia, it does not spread beyond the nymphæ. An extravasation beneath the deep layer of fascia may spread to the iliac fossæ or sacro-sciatic notch; if effused between the pelvic fascia and peritoneum, blood may either collect in one spot or extend throughout the pelvis, in the broad ligaments and even to the mesentery and diaphragm. If the extravasation is in the vaginal wall, it is shut in by the fibrous layer and does not spread to surrounding parts. The causes may be predisposing or determining.

1. *Predisposing Causes.*—These may be, according to Blot, either remote or direct. Pregnancy is the most important, since it results in general congestion and œdema of the genital tract. Primiparæ seem to be predisposed to intra-pelvic extravasations, while thrombus, on the other hand, appears to be more frequent in multiparæ. Narrowness of the vagina, pelvic deformities, and varices, have been regarded by all authorities as essential causes. Varices, however, do not seem to possess extreme importance, because Perret noted this condition only twice in 43 cases of thrombus; they seem, indeed, to play a secondary part in the production of these hemorrhages. Disturbances of the circulation, and in the composition of the blood in pregnant women, are also included among the predisposing causes.

2. *Determining Causes.*—Among these are to be mentioned the bruising caused by the fœtal part, by instruments, or even by the hand, when it is necessary to introduce the latter into the canal to perform version; also unusual size of the fœtus, repeated and awkward examinations, violent expulsive efforts, or even coughing or vomiting. Finally, local injuries, from falls, the jolting of a carriage, and external violence, are to be added. In few instances do thrombi appear after delivery without some appreciable cause.

Mode of Occurrence.—In consequence of the venous obstruction, the veins become dilated and their walls thinned; under the influence of one of the above-mentioned causes, rupture occurs at some point in the vessel-wall, and the blood escapes into the cellular tissue, its spread being favored by the looseness of the latter. When this accident takes place during pregnancy, it is almost alway due to external violence. During labor the congestion is increased by the pressure of the venous plexuses between the fœtal head and the bony walls of the pelvis; hence the greater frequency of intra-pelvic thrombus. After delivery the mechanism is the same; it is even possible, as Dubois affirms, that the vessels may be so contused that necrosis of their walls results, rupture following when the sudden afflux of blood takes place after delivery. From the rapidity with which the tumor develops, it is probably due to arterial, as well as venous, hemorrhage.

Symptoms.—The first is pain, which, however, is not invariably present; it usually precedes the formation of the thrombus by a brief interval, and is sharp and lancinating, radiating from the vulva and vagina to the loins and lower limbs. According to Perret, it is accompanied by a feeling of tenesmus and a bearing-down sensation. A tumor then appears either at the vulva or in the vagina, the latter being recognized by the touch; it is smooth, circumscribed when small, but diffuse when it is very extensive, and imparts to the fingers an elastic feeling, with or without fluctuation. It is generally of a dark livid color, and, after an interval, ecchymoses appear, either in the vicinity of the tumor, or on the buttocks and upper part of the thigh. If the swelling appears before delivery, it may offer a mechanical obstacle to the expulsion of the fœtus; it may at the same time cause symptoms of pressure, referable to the bladder or rectum, or may even displace the uterus. Finally, these tumors may retard expulsion of the placenta and cause later retention of the lochia. If the tumor does not rupture, it may give rise to all the symptoms of grave internal hemorrhage; if it does rupture, external hemorrhage, more or less profuse, may be added to the internal. The symptoms are of course directly proportionate to the severity of the hemorrhage; finally, symptoms of accompanying peritonitis, abdominal pains, nausea, vomiting, etc., may appear.

Termination.—The thrombus may become absorbed, may rupture subsequently, may be cured by adhesion of its walls, by suppuration, or by gangrene. Suppuration may follow spontaneous rupture or artificial opening of the tumor.

Diagnosis.—These tumors have sometimes escaped notice, or have been mistaken for other growths, the bag of water, the inverted or prolapsed uterus, or vagina, etc. These errors will be avoided by noting the phenomena which accompany the appearance of the enlargement.

Prognosis.—This is extremely grave when the thrombi are intra-pelvic, less so (though still serious) in other cases. If they occur before delivery they almost always result fatally for mother and child if after delivery, the child is unharmed and the mother's risks are somewhat lessened. However, the hemorrhage, and the possible occurrence of suppuration, render the prognosis grave.

Treatment.—This is preventive and curative; the former consists in relieving venous stasis (and the resulting varices) by insisting on the patients keeping a horizontal posture. The curative treatment varies according as the thrombus appears during pregnancy, labor, or after delivery; but, in general, we may say that the primary indication is to wait, and be ready to interfere if accidents seem to be imminent. During pregnancy, interfere only when the thrombus ruptures spontaneously. To make an incision is only to give freer vent to the hemorrhage, while it does not prevent internal bleeding, while astringent injections only cause the clots to be detached, and thus set up fresh oozing. Wait until the thrombus ruptures, then tampon with cotton, dry, or soaked in astringent solution, pure alcohol being preferable to perchloride of iron, since the latter favors suppuration. If the accident occurs during labor, the latter should be terminated as rapidly as possible by the forceps, rather than by version, and we should resort to incision only when it is unavoidable. Most authorities, however, are in favor of immediate incision, urging in support of it: 1. The necessity of removing the obstacle to the passage of the child; 2. The danger of extension of the extravasate through the pelvic cellular tissue; 3. The fact that rapid delivery does not always prevent rupture; 4. Immediate incision prevents the formation of clots and the consequent dangers of suppuration.

To these arguments we reply, with Hervieux: 1. The tumor is so soft that the fœtal head can easily pass it when aided by the forceps; 2. Intra-pelvic thrombi are rare, and the fear of their possible occurrence is not sufficient to justify operative interference; 3. If we tampon immediately after making an incision, the effect will be the same as if the tumor was let alone; 4. Fatal hemorrhages have occurred more frequently after the operation than when nothing was done; 5. Sloughing is more likely to follow premature opening of the thrombus.

After delivery operative interference is necessary after the hemorrhage has ceased, most of the blood has coagulated, and evidences of suppuration or gangrene are present. A free incision should be made, and the cavity should be thoroughly irrigated and drained.

Prolapse of the Vagina.

Cystocele or rectocele may exist before labor or may not appear until that period. The vagina is pushed before the fœtal head, and forms a large, livid mass which retards delivery; gangrene may result. We must prevent, or at least remedy, this prolapsus by emptying the bladder and rectum, and then pushing up the tumor and holding it up with one finger until the termination of the labor. If the prolapsus continues, the bad results of compression may be avoided by applying forceps and delivering as soon as possible.

Tumors of the Vulva and Vagina.

These are usually vegetations, abscesses, cysts, polypi and schirrous being rare. These tumors seldom cause serious trouble. Œdema of the vulva may be so excessive as to require scarification at the moment of delivery; it may be due to awkward manipulation with the hand or instruments.

Herniæ.

1. *Hernia of the Bladder.—Cystocele.*—Prolapse of the bladder and retention of urine is a frequent cause of dystocia, since it interferes with

the regularity and intensity of the uterine contractions. It is not by any means easy to pass the catheter, since the head is pressed against the neck of the bladder, and cannot be dislodged; we should not hesitate to use a metallic instrument, although we may sometimes succeed with an elastic catheter, especially if the woman is placed in the knee-elbow position. In some instances, it is impossible to withdraw the urine in any way, and the distended bladder finally ruptures. Vaginal cystocele may apparently become a cause of serious obstruction, but this disappears on using the catheter. As soon as the bladder is emptied it may be held up by two fingers, while, if necessary, labor is terminated by forceps (Fig. 136).

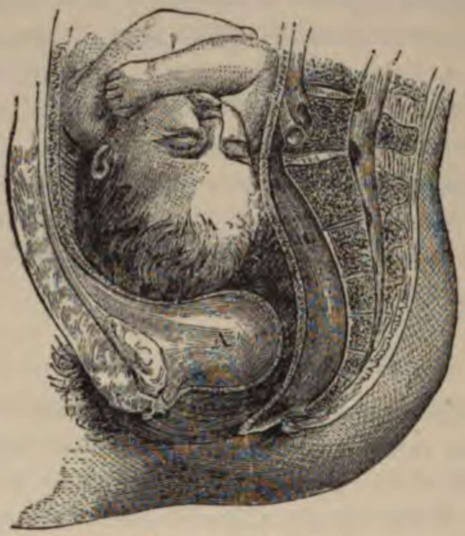


FIG. 136.—CYSTOCELE. (*Ramsbotham.*)—*A*, Portion of the prolapsed bladder.

2. *Hernia of the Intestine.—Enterocele.—Epiplocele.*—The intestine, or mesentery, may become engaged in the anterior or posterior cul-de-sac and constitute a true *vaginal hernia*; they may even descend as low as the perineum and form a perineal hernia. Finally, we designate under the name vagino-labial hernia a hernial tumor situated in the labium. These not only present a mechanical obstacle on account of their size, but they may become inflamed by reason of the pressure to which they are exposed, and strangulation may result. They must first of all be reduced, and kept so during the entire course of the labor.

Vesical Calculi.—Vesical calculi have rarely been noted as complications of pregnancy and delivery; they may, however, become a very serious cause of dystocia. If discovered before labor, they should be lifted above the superior strait, and retained there until the head has descended below them; if they are not detected until the time of labor, and are firmly impacted between the head and the symphysis, it is necessary, if the head cannot possibly pass the obstacle, to extract them either through the previously dilated urethra, or through an incision in the vesico-vaginal septum, the wound being immediately closed. Hugenberger (1875) reported 23 cases, in seven of which delivery occurred spontaneously; in eight interference was required. In seven instances the calculus was removed during labor. Winckel states that there are in all 29 recorded cases, in all of which the results were more or less serious.

Dystocia due to Obstruction at the Cervix.

The obstacles may be due to rigidity of the cervix, adhesion or obliteration of the same, or to lesions of various kinds, tumors, abscesses, etc., which prevent dilatation.

Rigidity of the Cervix.—Under this expression we refer to a peculiar condition characterized by passive or active resistance to dilatation on the part of the cervix, which thus retards delivery. There are three varieties of rigidity, termed by writers *anatomical, spasmodic,* and *pathological rigidity.*

A.—*Anatomical Rigidity or the Mechanical Rigidity of Pajot.*—This is often confused with that thickening of the cervix which is frequently noted in protracted labors; but in true anatomical rigidity the cervix has a peculiar feel, resembling oiled leather. Its border is firm, thick and resistant, but not painful; the cervix, although already dilated to a certain degree, preserves, as in cases of abortion, a sort of relative length, so that it forms a more or less prominent projection in the vaginal roof, in the centre of which is an orifice of variable size. The cervix itself is not sensitive to pressure, nor is the vagina in any manner, or more sensitive than usual. The uterine contractions occur regularly and strongly, but are without effect; during the contraction the cervix does not become altered as the head presses upon it, and the stage of dilatation may be prolonged for several days. It is only after labor has continued thus for a certain length of time that we observe heat and sensitiveness of the vagina, and often a little tenderness in the cervix. This condition is most common in primiparæ, and especially in premature labors. It is not serious, as a rule, as regards the fœtus, but the woman may be deprived of rest and sleep, and is thus rendered especially susceptible to post-partum troubles.

Baths, warm vaginal injections, and venesection are the best remedies in these cases. Opium and chloral enemata often act very beneficially.

B.—*Spasmodic Rigidity.*—Here the phenomena are quite different; there is no longer passive, but active, contraction, which may occur during the second as well as during the first stage, or even at the moment of delivery. It may occur in either multiparæ or primiparæ (especially the latter), of any variety of temperament, and is often due to frequent examinations, violent attempts at dilatation, and, above all, to ergot, and premature rupture of the membranes.

When spasmodic retraction occurs during the first stage, the labor appears to be progressing normally, when suddenly the cervix retracts, there being an actual spasm of the circular fibres surrounding the orifice. The pains are sometimes very severe, sometimes almost entirely absent, or separated by irregular intervals, and the uterus, instead of becoming relaxed in the interval between the contractions, remains contracted and tender on pressure; this is especially the case when the membranes have ruptured, the cervix grasping the fœtal parts immovably.

To the touch the cervix appears thin, especially at the os, the edge of which is firm and unyielding, like a wire; the part is extremely sensitive to the slightest touch and feels hot. The vagina is also hot and sensitive.

Vesical and rectal tenesmus, nausea, vomiting, great agitation and a more or less marked febrile reaction are frequently observed.

Sometimes the spasm of the cervix occurs during the stage of expulsion, as soon as the head is born, and may be situated at the internal, as well as at the external, os. This occurs above all in cases of version and extraction, and it is easy to understand how serious it may be for the child; the cervix, in fact, grasps the neck of the fœtus, which is thus held like a stud in its button-hole, and if this continues long the child succumbs. Finally, the spasm may occur during the third stage, as we shall see later.

Treatment.—Spasmodic contraction of the cervix is transient; if it occurs during the first stage, the rule is to wait until it ceases spontaneously. But if it is prolonged for several hours, the obstetrician should interfere.

Sitz, or full baths, emollient injections, fumigation with aromatics, venesection till syncope ensues, laudanum-enemata, and applications of belladonna to the cervix, have been recommended in turn. We have had some results from the application to the cervix of the watery extract of belladonna, but it often fails. Chloroform, pushed to the degree of complete anæsthesia, has been recommended, but in order to affect the uterine muscle it must be administered to a dangerous extent. Its principal action seems to be that of a nervous sedative; chloral accomplishes the same result without danger, and to it we give the preference. If chloral fails, and it becomes necessary to terminate the labor, we must resort to incision of the cervix. A long, blunt-pointed bistouri is passed along the left forefinger, and a small lateral incision is made at the sharp, rigid border of the os; one or two cuts are usually sufficient and dilatation then proceeds rapidly. Blot was once obliged to make eight incisions before the os would dilate. Such incisions are to be preferred to forced dilatation, after other remedies have failed. If the spasm is confined to the os internum, incision is absolutely contra-indicated, and we must try forced dilatation, although the latter should be regarded as an extreme measure, because it exposes the woman to extreme danger, and often leads to rupture of the uterus. If the spasm occurs after the birth of the head or trunk of the fœtus, we must act quickly, and either incise or dilate forcibly, according as the contraction is at the external or internal os.

C.—*Pathological Rigidity.*—This may be due to bands or cicatrices, tumors, or cancer of the cervix. It is to be distinguished from the other two varieties by the shape and peculiar character of the cervix.

II. *Obliteration of the Cervix.*

When limited to the os externum, this has been termed by Naegelé adhesion of the os externum. In this case the obstacle consists of a fibrous tissue similar to peritoneal adhesions. The entire cervical canal may be affected, a condition called by Depaul complete obliteration of the cervix; this is much rarer than the partial forms.

Causes.—Injuries during parturition, especially from the use of instruments and cauterization of the cervix are among the causes. In closure of the os externum the finger seems to enter a cul-de-sac at the upper part of the vagina, no orifice being felt; or the cervix may be felt, but there is only a slight central depression. How shall we recognize complete obliteration?

1. *Obliteration of the Os Internum.*—A suspicion of the existence of this condition will be aroused when the uterine contractions have continued for some time without producing the usual results. The finger passes through the os externum and meets at the level of the os internum, a complete septum without any opening. Through the speculum the condition will be recognized at once.

2. *Obliteration of the Os Externum.*—On examination a smooth, rounded tumor will be felt at the upper part of the vagina, having a firm consistence (if the head presents), but without any projection, orifice, or depression, suggesting the cervix. The adhesion in this instance is between the lips; sometimes a slight prominence may be felt, or a small depression, without any orifice, which indicates beyond doubt the site of the obliterated os. The vagina is dry, there being neither mucus, nor amniotic fluid. The uterine contractions produce no change in this condition.

This alteration is not to be mistaken for deviation of the os, a malformation of the portio vaginalis, atresia of the cervix, or cicatricial bands or septa in the vagina.

Prognosis.—This is graver than would at first appear. When the cicatricial tissue is old and dense, surgical interference may be necessary.

Treatment.—Wait till you are sure that nature cannot overcome the obstacle, then try to dilate with the finger, and finally resort to incision, because eclampsia and rupture of the uterus may result from too long delay. We must always operate at the point of obliteration, which can easily be found when it is situated at the os internum, because the canal is a guide to it; when the os externum is closed, we must determine the point of least resistance, and then introduce the bistoury, dividing each layer of tissue in turn, and not by a single cut. The finger glides between the uterine wall and the fœtal part, and the opening is then enlarged by multiple incisions. Before operating, be sure that there is really an obliteration of the orifice and not merely a deviation of the same, because a fatal error has been made in this way. We should not confine ourselves to an examination by the finger and speculum, but should chloroform the patient, and introduce the whole hand into the vagina, if necessary, before proceeding to make an incision. Hecker has reported a unique case of agglutination of the os uteri produced by its union with the membranes.

III. *Deviations of the Os.*

These follow displacements of the uterus, the cervix being carried backwards or forwards, according as the organ is ante- or retroverted; the former is most common. As labor proceeds, the cervix will be carried so much farther backwards, according as the lower uterine segment projects farther into the vagina. The cervix dilates very slowly in these cases, since the contracting force is exercised upon its anterior and upper part.

It is sufficient to draw the cervix forwards into the pelvic axis during the pain, and to keep the woman on her back, reversing the former manœuvre if the cervix point forwards. In some cases this deviation of the cervix may be due to what Depaul has called "sacciform dilatation" of the uterus; the cervix is pushed up above the symphysis, so that it is extremely difficult to reach it. This may become a very serious cause of dystocia.

IV. *Swelling and Elongation of the Anterior Lip of the Cervix.*

In this condition, which is most common in primiparæ, the anterior lip is firmly wedged between the symphysis and the head, and if labor is not speedily terminated, especially if the pelvis is somewhat contracted, the lip forms a tumefaction below the head, that sometimes offers a serious obstacle to the expulsion of the fœtus. The more the head tends to descend, the more the swelling increases, and the greater the obstacle. In some cases the lip can be pushed upwards, and retained during the pains until the head slips past it, but it is usually necessary to apply the forceps. As a result of pressure thrombi may be formed in the lip, or the latter may tear and give rise to more or less serious hemorrhage.

Cazeaux has also mentioned, as causes of dystocia, abscess of the cervix, fungoid tumors, vegetations, and simple hypertrophy.

V. *Cancer of the Cervix.*

Theoretically, cancer of the uterus does not prevent fecundation, except as it depresses the general health of the woman; no obstacle is offered to the passage of the spermatozoa. Guéniot believes that pregnancy can only take place during the initial stage of cancer, since in the ulcerative stage not only are conjugal relations necessarily prevented, but numerous obstacles are presented to the union of the semen and the ovum. On the contrary, out of 127 cases observed by Cohnstein, in 21 the cancer had existed from several months to a year before pregnancy occurred; he even goes further and affirms that it favors the development of pregnancy in women between certain ages. We do not accept this view. In 21 cases Cohnstein was able to demonstrate that cancer existed for several months before pregnancy occurred, and in several instances it was not prevented by the presence of ulceration. Non-fungating epithelioma is the usual form, occurring 117 times in his 127 cases, the cauliflower appearance being noted only 10 times.

The Mutual Influence of Pregnancy and Cancer.—The course of the pregnancy seems to depend essentially on the location, rather than on the extent, of the degeneration. It is less likely to be interrupted if the disease is limited to the lips of the cervix, while as the cancer extends to the os internum, the chances of abortion increase. Lewes noted 40 per cent. of abortions in 120 cases, while Cohnstein saw 68 deliveries at term among 100 patients. Sometimes the pregnancy is prolonged past the usual time, or the fœtus dies and is retained in the uterus. In 5 per cent. of the cases observed by Cohnstein the pregnancy pursued its usual course with very slight disturbances, but in all the rest there were various troubles, emaciation, slow fever, and œdema often appearing during the latter months, as well as neuralgic pains and psychical disturbances.

The Influence of Pregnancy on Cancer.—Cohnstein says if cancer begins during pregnancy, it always develops more or less rapidly; if, on the contrary, it existed for some time before pregnancy, the influence of this condition seems to be relatively favorable. Gusserow, however, mentions a number of cases, proving that the neoplasm develops with extreme rapidity. The favorable influence of pregnancy, according to Cohnstein, is shown by the marked diminution of the hemorrhages, at least during the early months, the lessening of pain, and the improvement in the general condition. If breaking down of the tissues takes place at this time, the change is rather fatty degeneration than necrosis. Contrary to its course in the non-pregnant woman, the cancer very rarely extends to the body of the uterus, the bladder, or the vagina.

Diagnosis.—The only difficulty, according to Gusserow, is at the outset of the disease; still many errors have been made. The hemorrhage may be mistaken for that due to placenta prævia.

When the cancer is confined to one lip of the cervix, spontaneous delivery is the rule, the prognosis being more favorable for both mother and child when the posterior lip alone is affected. When both lips are diseased, or nearly the whole of the portio vaginalis, spontaneous delivery is more rare; the cervix may tear in several places, and rupture of the uterus may result from extension of the lacerations. Hemorrhage, suppuration and death from peritonitis, or septicæmia, are common results. The delivery is more apt to be spontaneous when it is premature. When the cancer has extended to the body of the uterus and to the surrounding tissues, spontaneous delivery is impossible. If the contractions are violent the uterus may rupture, if they are feeble the fœtus may be retained, and the patient may succumb to hemorrhage or septicæmia.

If delivery is spontaneous, the woman may improve, and even become pregnant again, or she may succumb to the disease later; if labor has been long, the lesions of the cervix produced by the passage of the child are followed by gangrene of the diseased parts, septicæmia, and peritonitis, and the mother succumbs to the puerperal complications.

Prognosis.—This depends upon the character, location, and extent of the disease, but in general it is more grave for the child than for the mother. Chantreuil noted 25 deaths during and after labor among 68 women; out of 70 children, 28 were born alive. Among 126 women observed by Cohnstein, 54 survived; 42 children out of 116 were born alive, while of the 74 who perished, 7 were delivered after embryotomy, 14 were retained in the uterus, and 6 died from the effects of protracted labor and extraction. The total mortality was 38.8 per cent.

Treatment.—The first question which presents itself with reference to cancer of the uterus is: Can we, and should we, operate upon the cancer during pregnancy? Should cauterization, amputation or extirpation of the diseased part be attempted? A number of cases have been reported in which the cancer was excised during pregnancy, not only without interrupting its course, but with the result of rendering labors less difficult, and causing the delivery of living children.

We can not view the subject in this light; in the presence of a disease which is certain to destroy the mother sooner or later, we should think first of the child. Operations performed during pregnancy not only compromise seriously the life of the mother, but almost inevitably interrupt gestation, and hence defeat the end which we propose, *viz.*, the safety of the child. The treatment should be expectant, limited to controlling the hemorrhage by astringent and antiseptic injections. As soon as labor has begun we should be ready to incise the cervix and apply forceps if the interest of the child demands it; this applies also to cases in which the disease has extended to the os internum. Expectant treatment is far from being without danger, since out of 47 cases in which this was adopted, 12 terminated fatally in consequence of rupture of the uterus, and three from laceration of the cervix. Manual dilatation has been tried in vain, but incision of the cervix, as advised by Baudelocque, followed by the use of the forceps, version, or the cephalotribe, has been most generally adopted, the average results being 50 per cent. of recoveries for the mothers and 62.5 per cent. for the children. It seems as if the forceps should be much preferred to version, since we find that with the former 75 per cent. of the mothers and 50 per cent. of the children were saved, while after version, only 18 per cent. of the mothers and 12.5 per cent. of the children survived. Cephalotripsy does not appear to offer any advantages for the mother. Out of 6 cases collected by Cohnstein, 4 died.

Incisions followed by the application of the forceps is really the best procedure, since dilatation with Barnes' bags, followed by version, has given much less favorable results. We believe that the induction of premature labor should be absolutely rejected, in view of the incurable nature of the mother's malady and the importance of saving the child; the same interference is necessary after the induction of artificial labor as in labor at term, hence there is no advantage in it. Cæsarian section has been performed five times, two children being delivered alive, one of whom died immediately after the operation. These results are certainly discouraging; still, if the disease had invaded the lower segment of the uterus, if the pregnancy had reached full term, the fœtal heart-beats were normal, the membranes intact, and the cervix had not, for several hours, been affected by the uterine contractions, we believe that we should hardly be justified in hesitating, and that we should have recourse to Cæsarian section, which ought under these circumstances, to give a living child.

VI. *Fibroid Tumors of the Uterus.*

These are designated by various terms (fibroma, fibro-myoma, etc.) according to the relative predominance in them of fibrous or muscular tissue. They may be interstitial, sub-peritoneal, or sub-mucous, the intra-uterine growths being frequently polypoid. Their most common site is the posterior wall of the corpus uteri, fibromata of the cervix being rare. Out of 74 cases of fibroid in the non-pregnant woman, Chahbazian found only 4 in the cervix, Guyon 21 out of 111, and Sims 2 out of 114 cases; out of 380 cases in which pregnancy and labor were complicated by fibroids, Chahbazian found 80 tumors in the cervix, 38 being sub-mucous polypi, 10 sub-mucous sessile growths, 29 interstitial, and 2 sub-peritoneal. They usually occupied the posterior lip of the cervix, and rarely involved both.

Aside from the changes which pregnancy and parturition cause in myomata, they may become hypertrophied, atrophied, fatty degenerated, colloidal (*géodes* of Cruveilhier), and vascular; in consequence of the latter, œdema, congestion, infiltration, extravasation of blood, or gangrene may be consecutive to this vascular dilatation. Each of these conditions may affect the general health and cause peritonitis, usually circumscribed, which results in the formation of adhesions between the myoma and neighboring parts.

Myomata do not offer an insurmountable obstacle to pregnancy, and we must study in succession the relations which these tumors bear to fecundation, pregnancy and parturition.

1. *Fecundation.*—Although this is not impossible, there is a connection between sterility and the presence of these fibromata. While many writers believe that sterility is itself a direct cause of the development of fibroids, nearly all specialists in gynecology think fibroids cause sterility. We indorse the latter view, since it is easy to understand how the catarrh and hemorrhage due to the presence of these tumors (especially the sub-mucous variety) prevent conception. The modifications in the shape, situation, and cavity of the uterus, and the altered relations between the ovary and tube, are so many mechanical obstacles to fecundation.

In addition fibroids are more common in married than in single women, since out of 1634 women 1192 were married and 442 single. Marion Sims found 119 cases of fibroids in 605 sterile women; among 255 women, observed by the same writer, who had had only one child, fibroids were detected in 38; among 250 who had never been pregnant, 57 had tumors; while in 100 young girls, suffering from pelvic troubles, 24 had fibromata. That the chances of fecundation are greatly lessened by the presence of fibroids will appear from the fact that among 1554 women with fibroids, observed by Winckel, Schroeder, Gusserow, and others, 476, or 1 in 3.05, were sterile. Now, on the authority of Courty, Simpson, and Spencer Wells, sterility is present in 1 marriage out of every 8 or 8.5. These tumors, indeed, really prevent the union of the male and female elements, by causing displacements of the uterus, obliterating the uterine cavity and the opening of the tubes, causing spasmodic contraction of the os internum, etc.; also by leading to catarrh and hemorrhage, and to circumscribed peritonitis, with the disturbances consequent upon the formation of adhesions.

The Influence of Pregnancy on Fibromata.—As the myoma is composed of tissue identical with that of the uterus it is not at all strange that it should be modified by pregnancy; but we must distinguish between fibromata, fibro-myomata, and myomata, since they undergo different changes. These changes depend, moreover, upon the seat of the tumor; the more intimate its relations to the uterus, the more will it share in the physiological phenomena which take place in that organ, and the more closely its structure approaches to that of the uterus the more profound will be these modifications. Thus, sub-peritoneal tumors undergo relatively fewer changes than the interstitial and sub-mucous variety. Fibromata, the tissue of which is denser and more compact, are less affected than myomata, in which muscular fibre is the predominating element. These changes are of several kinds, *viz.*:

1. Fibroid tumors increase in volume during pregnancy, and after delivery undergo a retrogression or involution, analogous to that of the uterus; this has been determined beyond doubt by numerous observers. The entire disappearance of a myoma is very rare, and as a rule it may be affirmed that although fibroid tumors do undergo involution, they are always a little larger than they were before the occurrence of pregnancy.

2. At the same time that they increase in size, the fibroid growths

become actually softer. This softening may be due simply to the œdema which results from increase in the blood-supply, or it may be a pathological process.

3. Finally, during the latter months, these tumors seem to undergo a peculiar change, that is due to true absorption of their tissue. Depaul says that neither hypertrophy nor softening is constantly observed, and that one condition might exist independently of the other.

In many cases these tumors may become flattened, so that they can not be felt during pregnancy, and are not recognized until after delivery. This phenomenon is most often observed in pure interstitial myomata.

The following table, which we take from Chahbazian's monograph, shows the influence which pregnancy and labor exert in particular on fibromata of the cervix. In 39 cases:—

Hypertrophy during pregnancy,	7
Displacement,	9
Softening,	10
Expulsion,	4
Irritability,	3
Atrophy after labor,	6

The Influence of Fibrous Tumors on Pregnancy.—Lefour has found that a certain proportion of cases of extra-uterine fœtation are associated with fibroids; hence he believes that the ovum is prevented from traversing the tube that has become obliterated in consequence of its being dis-

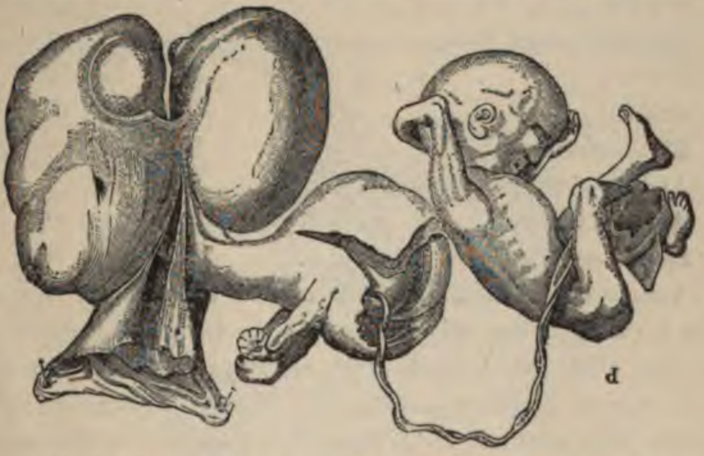


FIG. 137.—EXTRA-UTERINE PREGNANCY WITH FIBROID TUMOR. (*Gusserow*)

placed or compressed by the fibrous growth (Fig. 137). When the ovum has succeeded in reaching the uterine cavity, fibroid tumors tend to make it descend to the lower segment of the uterus; hence the relatively greater frequency of abnormal insertion of the placenta.

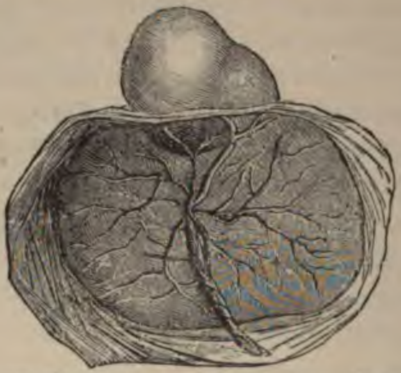


FIG. 138.—PLACENTA PARTIALLY INSERTED ON A FIBROID.

Thus Nauss found abnormal insertion once out of 49 cases, and Lefour once out of 23.71 cases. This frequency, indeed, is much greater than aside from fibrous growths, as is proved by the following statistics cited by Lefour.

Schwartz,	1 in	1564	labors.
Collins,	"	1492	"
McClintock and Hardy,	"	829	"
Klein,	"	760	"
Arneth,	"	725	"
Ramsbotham,	"	665	"
At Wurtzbourg Maternity,	"	472	"
At Paris Clinic,	"	242	"
Spiegelberg,	"	1000	"

It is a curious fact that the placenta may be inserted not only at the inferior segment of the uterus, but even on the fibrous growth itself (Fig. 138). On the other hand, pregnancy may pursue its regular course, even in cases of multiple fibroids (Fig. 139). However, abortion and premature labor result in about once in 1.4 cases. Chahbazian found that in 114 cases of fibroid (especially of the cervix) there were 50 deliveries at term (in 10 labor was very difficult), 10 premature births and 8 abortions, 10 in which hemorrhage occurred during pregnancy, and 6 in which it took place during, or after, delivery; rupture of the uterus resulted in 5 instances, prolapsus in 5, flattening of the fœtus in 5, and retention of the same in 3.

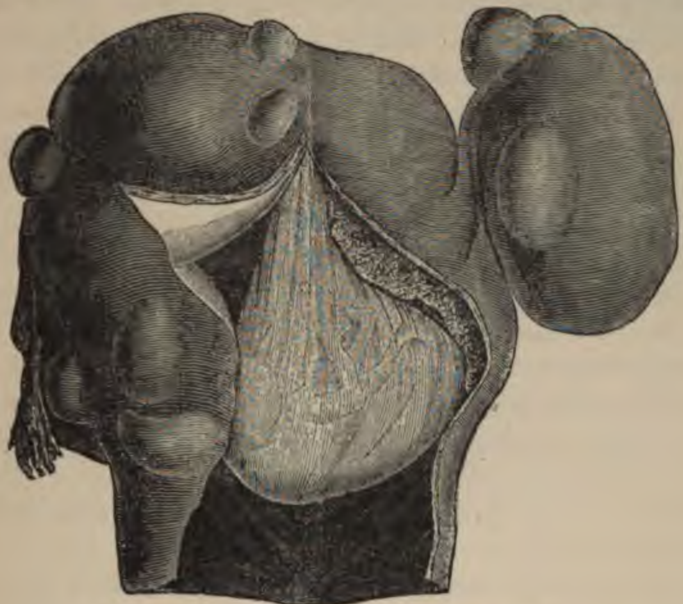


FIG. 139.—GRAVID UTERUS AND MULTIPLE FIBROIDS.

The situation of the tumor is important. If it is outside of the true pelvis, it rises with the enlarging uterus, and only affects the progress of

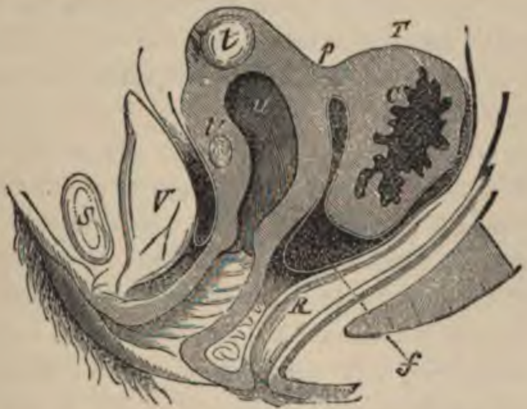


FIG. 140.—FIBROIDS OF THE UTERUS. (*Tarnier.*)—*s*, Symphysis. *v*, Bladder. *t*, Small tumor. *T*, Large tumor. *c*, Cavity of tumor. *r*, Rectum. *b*, Douglass' fossa. *p*, Pedicle of tumor.

pregnancy in so far as it gives rise to pressure-symptoms. If a subperitoneal fibroid with a long pedicle is situated between one side of the uterus and the corresponding pelvic wall, the pressure will be such as to diminish the chances of the pregnancy going on to term; if the tumor is situated merely between the walls of the pelvis, it ceases to press upon the uterus as soon as the latter has risen out of the pelvis (fourth month). The myoma may undergo morbid changes which exert an unfavorable influence on the general health, incompatible with the prolongation of pregnancy. Moreover, tumors in the posterior uterine wall may cause retroversion, with consequent incarceration and abortion.

If the tumor is intra-uterine, it grows simultaneously with the fœtus; if located between the pelvic wall and the lower two-thirds of the uterus these tumors, whether sessile or pediculated, are the most dangerous of all, as regards pregnancy, especially if they are in the posterior wall. Hemorrhage is less common than might be supposed, since it most often accompanies sub-mucous tumors which are rarely associated with pregnancy as compared with sub-peritoneal. Finally, Gusserow has shown that the tumor may, during pregnancy, compress the fœtus itself, and thus may cause abortion.

Delivery in Case of Fibroid Tumors.—The location of the fibroids is of more importance than the number and size. If the tumor is situated at the cervix it may, by its size alone, become a cause of dystocia, but by enucleating it, the obstacle will usually be overcome. If the tumor is sub-mucous it is also proportionately less dangerous, because it is pediculated, and if it is situated in the inferior segment of the uterus, it will often be expelled before the fœtus, and then the pedicle will either rupture itself, or it may be divided, thus facilitating the expulsion of the child.

If the tumor is situated higher up, delivery may be more difficult, and may necessitate interference with the forceps or even with the cephalotribe. But these cases are rare, and such tumors are usually not perceived until after delivery. Then they manifest their presence by hemorrhages and pain, and they are either expelled spontaneously, or are removed artificially. But, if the tumors are interstitial, and occupy the lower segment of the uterus, they may resemble sub-serous growths of the cervix, and may cause serious difficulties.

When, on the contrary, they are higher still, they usually affect the delivery but slightly. If they are at first pushed into the pelvis in front of the child, they often ascend above the fœtal part after the rupture of the membranes, under the influence of the uterine contraction, and thus allow its passage; or they are so softened that they are flattened out by the fœtal part, and delivery takes place spontaneously, although it is retarded. This delay in labor has been observed by all authorities, who, aside from the difficulty which is inherent in the obstacle to be overcome, attribute it in great part to the feebleness of the uterine contractions. Lefour believes that this feebleness is due to uterine inertia, following ineffectual attempts to overcome the obstacle. Sub-peritoneal fibroids complicate labor when they are situated at the inferior segment, and especially at the cervix. If there is a long pedicle, the tumor may descend into Douglass' pouch, and become impacted. When interstitial or sub-peritoneal fibroids are situated at the inferior segment or at the cervix, and thus more or less completely fill the pelvis, they oppose an enormous obstacle to delivery; however, this should not necessarily be regarded as insurmountable, because, in this case, delivery may be effected either spontaneously or artificially. Here the size of the tumor, although it is an important element, is not the principal one, since it is rather the situation of the growth with reference to the pelvis; small tumors in a bad situation may be relatively more dangerous than those of much larger size.

Delivery occurs in these cases by a special mechanism, which has been thoroughly studied by Depaul and Guéniot and more recently by Lefour. The tumor is not only compressed and softened, but it is displaced upwards into the abdominal cavity, so as to allow the passage of the fœtus. Lefour affirms that this ascension may take place during pregnancy, during the latter days of pregnancy, and at the beginning of labor, or during labor.

1. *During Pregnancy.*—As the lower segment of the uterus develops at the expense of the anterior, rather than of the posterior wall, the latter extends upwards, carrying with it the sessile fibroid which is commonly attached here, or the ascent of the uterus as a whole tends to displace the tumor upwards.

2. *During the latter Days of Pregnancy, and at the beginning of Labor.*—The tumor may be carried upwards by reason of the contraction of the longitudinal muscular fibres of the uterus; but these contractions are

not enough in themselves to elevate a large tumor above the superior strait; they merely dislodge it and render it somewhat movable, the elevation being accomplished during the period of dilatation or expulsion. Fibromata often become adherent to the neighboring parts, and if these adhesions are firm, all the efforts of the uterus will be unavailing; if, on the contrary, these are loose, they will yield during the stage of dilatation.

3. *During Labor.*—Large, sessile, sub-peritoneal tumors, with broad bases, are especially apt to ascend during labor, this ascension being due to three causes, the uterine contraction, the dilatation of the cervix, and the escape of the amniotic fluid. As the longitudinal fibres contract, they exert traction simultaneously upon the os uteri and the tumor; as the former dilates the latter is displaced upwards. When the membranes rupture the uterine walls retract, and consequently the lower segment is slightly elevated. Unfortunately, this ascension or displacement of the tumor, does not always take place, whence arise insurmountable obstacles, which may render Cæsarian section necessary. But, aside from the difficulties attributable to fibroid tumors, there are others that come from mal-presentations of the fœtus, which are much more frequent in pregnancies complicated with fibroids; thus, in 22 cases observed by Tarnier, 9 were breech-presentations; in 86 reported by Nauss, 18 were shoulder and 22 breech-presentations; in 48 reported by Toloczinow, in 10 the trunk presented, in 13 the breech; in 68 by Susserott, there were 12 of the former and 16 of the latter; in 102 by Lefour, 17 of the former and 33 of the latter. According to the statistics of Dubois and Depaul, the average number of presentations of the trunk in normal labors is 0.04, of the breech, 4.2. Breech-presentations are regarded as the most favorable in cases of fibroid tumors, and vertex-presentations the most serious.

Delivery is usually spontaneous, and presents no difficulties, although in some instances artificial delivery is necessary and is tedious. If the placenta is inserted on the tumor, the danger is extreme, six out of nine patients having perished from profuse hemorrhages. The prognosis is then very serious both for the child and the mother, but especially for the latter. In fact, aside from the dangers to which they may be exposed during pregnancy, by reason of the pathological changes which fibrous tumors may undergo, and the retroversion of the uterus, these growths may become impacted, and may then cause pressure-symptoms referable to the bladder, which may be so excessive as to exactly resemble those due to incarceration; we should mention also hemorrhages, retardation of labor, abnormal insertion of the placenta, mal-presentation of the fœtus, inversion and rupture of the uterus, etc. To show the gravity of the prognosis, it may be mentioned that out of 287 women observed by Nauss, 123, or 53.92 per cent. succumbed, while out of 147 reported by Susserott, 88, or 53 per cent. died; the fœtal mortality was in the former instance 57.2 per cent., in the latter, 66 per cent. Even when spontaneous delivery takes place, the children may be compromised by the existence of the tumor alone, the fœtal head being compressed and flattened by the tumor.

There was a case in our clinic, in which pregnancy was complicated by a larger fibroid tumor that was inserted at the junction of the cervix and body, and filled the entire pelvis; the child was living at the beginning of labor, and was delivered spontaneously on the day following the perforation of its head. A second patient was brought to the clinic after having been in labor four days, her abdomen being enormously distended, and so painful that palpation was impossible. The os was partially dilated so that the fœtal head could be felt; perforation was resorted to, but the child could not be extracted, and the woman died undelivered, the character of the obstruction not being recognized until the autopsy. Fig. 141 explains the condition which existed.

Diagnosis.—In some cases this is quite easy, but in the majority it is very difficult and errors are frequent even among the most expert. Sometimes the presence of the tumor is recognized, but pregnancy is not suspected; sometimes, on the other hand, the latter condition is detected, as well as the fact that it is complicated, but the character of the growth is obscure. The rule is to wait, before giving a positive opinion, until the fact of pregnancy is established, and then to investigate the nature of the complication. In many cases women know that they have fibroids; the diagnosis is then complete.

Pregnancy complicated with fibroids has been mistaken for moles and hydatids, multiple pregnancy, hæmatocele, etc.; the tumors have been taken for fœtal parts (head, breech, or shoulder). The conditions most liable to be mistaken for it are extra-uterine pregnancy, hypertrophy of the uterus (especially of the lower segment), thrombus, or cancer of the cervix, tumors of the broad ligaments and ovaries, and, in fact, any abdominal tumors that have descended into the posterior cul-de-sac. Three of these deserve particular attention, *viz.:* Retroversion, ovarian cyst, and extra-uterine pregnancy.

1. *Retroversion.*—This may cause the same pressure-symptoms and present the same sensation to the examining finger; but, in retroversion, the symptoms are not so gradual in their onset as those produced by a fibroid; the tumor appears smoother and more regular, and it is often possible to feel the fœtal parts through the uterine wall. Retroversion always occurs in the fourth or fifth month of pregnancy, and all doubts are removed by the reduction of the organ, when this is possible.

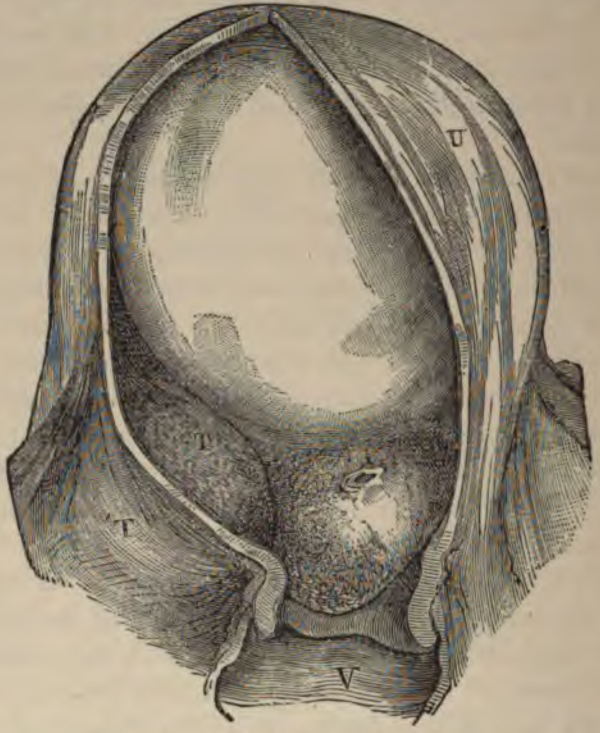


FIG. 141.—INTERSTITIAL MYOMA INVADING THE BODY AND THE CERVIX.—*T*, Uterine portion of tumor. *T*, Extrauterine portion of tumor. *V*, Vagina. *U*, Uterus opened in median line.

2. *Ovarian Cysts.*—The diagnosis is only really difficult when the cyst is contained within the pelvic cavity. We must then combine the rectal and vaginal touch with palpation, in order to appreciate the physical characteristics of the tumor. It will sometimes be possible, while holding the

pregnant uterus, to displace the tumor which does not form a part of it. More frequently the cyst descends into the posterior cul-de-sac, and by the touch its rounded surface, resistance, mobility and fluctuation may be appreciated. But even fluctuation is not a positive sign, since it may be simulated by a softened fibroid. The differential diagnosis in the case of a solid tumor of the ovary, that had descended into the retro-uterine pouch, would be still more difficult, not to say impossible.

3. *Extra-uterine Pregnancy.*—The tumors in the two cases are alike in their attachment to the uterus, their continuous growth, and in the fact that localized pains, spontaneous, and on making pressure, are common to both conditions; in both cases there may be hemorrhage. But an extra-uterine pregnancy is more elastic to the touch, the fœtal parts seem to be situated just beneath the skin, and, above all, while in pregnancy complicated with fibroid, the uterus and the tumors develop simultaneously, in cases of extra-uterine fœtation the uterus developes much less, and it is sometimes easy to distinguish a distinct division between the two tumors.

Complications.—During pregnancy, there are neuralgia, cramps, obstruction of the circulation, œdema, vesical and rectal disturbances, ascites, etc., all of which are referable to mechanical pressure; morbid changes in the tumor may lead to hemorrhage or peritonitis. During labor prolapse of the cord, or of fœtal parts, rupture of the uterus, etc., may occur. Retention of the placenta, inversion of the uterus, and hemorrhage, frequently complicate the third stage.

Treatment.—Forbid marriage and conception in every case. During pregnancy oppose the threatening abortion, and do everything to prolong the pregnancy until term. Surgical interference is limited to small sessile or pediculated growths, situated in the inferior segment and accessible through the vagina; the latter form being removed with the écraseur, the former excised. Induced abortion, as well as Porro's operation, should be rejected, especially before term. During labor, allow nature as large an opportunity as is possible, then reduce the size of the fœtus, or try to enucleate the tumor. Tarnier prefers version, Depaul the forceps. Susserott reports 20 forceps deliveries and 20 versions out of 147 cases, 12 mothers and 7 children being saved by the former method, 8 mothers and 3 children by the latter. Out of 26 forceps deliveries, reported by Lefour, 19 mothers and 13 children were saved. The forceps seem, then, to give better results than version. But, in some cases forceps or version do not avail, and we are obliged to have recourse either to the cephalotribe or to embryotomy. Finally, as a last resort, we have Cæsarean section. Cazin noted 24 deaths in 28 operations, only 15 children being saved; hysterectomy has been performed 5 times with 5 deaths.

Chahbazian resumes, in the following table, the results of treatment of fibroids of the cervix during pregnancy and labor:

	Mothers Died.	Infants Died.
8 Extirp. during pregnancy,	1	3
32 Expectation,	9 (2 not noted)	14 (11 not noted)
3 Pushed up during labor,	1	
12 Extirp. " "	1	5 (2 " ")
5 Forceps,		(2 " ")
3 Version,	1	1 (1 " ")
2 Manual Extraction	1	
1 Blunt hook,	1	1
5 Embryotomy,	3	5
6 Cæs. section,	5	3 (1 " ")
17 Extirp. after delivery,	4	

4. *During the Puerperium.*—Fibromata which have escaped detection during pregnancy by reason of their being flattened, often appear after delivery, inconsequence of sub-involution. Interstitial or sub-serous tumors with broad bases then become pediculated and may be palpated, but, as a rule, the tumors undergo atrophy similar to that of the uterus, so that they may even disappear entirely. Sometimes it has been observed that fibroid tumors are enucleated and expelled from the uterine cavity; in other cases the tumor has sloughed away. Hemorrhage, retained placenta and consequent septic absorption, serious nervous troubles, syncope, peritonitis, inversion of the uterus, eclampsia, and rupture of the bladder, are among the resulting complications. Interference during convalescence depends upon the condition of the tumor, the nature of the complications, and the general state of the woman.

VII. *Herniæ.*

It is extremely rare for the uterus to escape by one of the natural openings of the abdomen, such as the inguinal or crural, so as to form a true hernia. According to Schroeder, umbilical and ventral herniæ are most common. True ventral hernia of the gravid uterus is very rare; there are on record, however, a number of cases in which the uterus at an advanced stage of pregnancy was situated in a hernial sac, formed by the dilatation of a large cicatrix in the abdominal wall. A few cases are on record in which pregnancy advanced to term in a uterus which formed a crural or inguinal hernia. The diagnosis of hysterocele is difficult during the first half of pregnancy, when the portio vaginalis is outside of the hernial sac; at a later stage the disturbance of micturition, the displacement of the urethra, and the movements of the fœtus, help to clear up the diagnosis.

The treatment consists in the reduction of the hernia, and, if this is unsuccessful, in the induction of abortion, and in the use of version or the forceps. But, in the majority of the known cases, the termination of the labor *per vias naturales* has been impossible, and it has been necessary to resort to Cæsarean section.

VIII. *Ovarian Tumors.*

Although the possibility of conception is admissible *á priori* in cases in which only one ovary is affected, whatever may be the size of the tumor, it is difficult to understand how it can occur when both ovaries are diseased, and yet the facts reported by Atlee, Spiegelberg and others, prove the possibility of conception under these conditions, and with ovarian tumors of different kinds. The following statistics of Jetter show that any variety of ovarian tumor may complicate pregnancy. Out of 166 cases, there were 97 ordinary cystomata, 31 dermoid cysts, 11 carcinomata and 27 uncertain. In most of the cases the tumors existed for some time before the occurrence of pregnancy; the latter has taken place where one, or even both, of the ovaries was diseased, and this proves that as long as a portion (no matter how small), of the ovary remains in a healthy condition, ovulation and conception are possible.

The Influence of Pregnancy on ovarian Tumors.—Although this influence is usually *nil*, or at least insignificant, in a number of cases the tumor undergoes marked changes. Spiegelberg affirms that under the influence of pregnancy, and the increased activity of the pelvic circulation, ovarian tumors often grow with extreme rapidity. Wernich not only adopts this view, but also believes that under the influence of pregnancy, a benign growth may become malignant. Ruge explains the latter change by supposing that a malignant element was originally present. Doumairòn has called attention to the frequency with which localized peritonitis developes in consequence of the friction of the cyst against the abdominal walls, the intestines, and uterus, as well as to the changes and inflammations that may take place within the cyst. He has even reported rupture of the cyst and escape of the contents into the abdominal cavity, and some rare cases in which, in consequence of inflammation, cysts have discharged spontaneously, either externally, or into one of the pelvic viscera. Simple cysts are most frequent, and dermoid the next; the latter are most influenced by pregnancy, since, on account of their relatively smaller size, they occupy the true pelvis.

The Influence of Cysts on Pregnancy.—The size of the cyst does not usually have any considerable influence on pregnancy, as long as it is non-adherent, and has a pedicle sufficiently long to allow of its floating freely in the abdomen. If the tumor is small, it nearly always lodges in the posterior *cul-de-sac*, especially at one side; if not adherent, it rises into the abdomen with the uterus. If, on the contrary, it is a solid growth, and contracts adhesions that keep it within the pelvis, it gives rise to symptoms of incarceration on the part of the uterus, with compression of the bladder and rectum. When the cyst has risen out of the pelvis, it occupies one side of the abdomen, while the uterus occupies the other, so that two distinct tumors are felt on palpation, the character of each being so distinct as to allow of an exact diagnosis; the abdomen is then enormous, and œdema, ascites, varices, disturbances of respiration, etc., result. Again, the cyst may be situated in front of the uterus, so as to conceal the development of that organ, and thus to deceive the physician.

The Influence of Cystic Tumors on Delivery.—They often cause dystocia, so that interference becomes necessary. If the cyst is small and fluid and non-adherent, with a pedicle more or less relaxed, it is generally pushed upwards above the superior strait, and does not descend into the pelvis again till after delivery. If it is of large size, but is fixed in the abdomen, obstruction occurs only when a portion of the cyst is at the same time engaged in the pelvis; it is then imprisoned between the head of the fœtus and the pelvic wall, and thus forms a direct impediment to the expulsion of the child. Ordinarily, these cysts act indirectly by causing oblique deviation of the uterus and mal-presentation of the fœtus, and by interfering with the strength and regularity of the uterine contractions. If the cyst occupies the pelvis, the case is different; such cysts are originally located in the posterior *cul-de-sac*, and before they grow sufficiently to fill the entire pelvis, they are more or less fixed by adhesions, and thus form a more or less complete obstruction of the canal. Sometimes the fœtal part will tend to push the tumor before it, but the efforts of the uterus will be ineffectual; or the tumor may prevent the fœtal part from engaging, and keep it above the superior strait, when compression will take place. (Fig. 142.) Hemorrhage, rupture of the cyst, etc., have occurred, as well as bruising and inflammation of its walls, but the patients in these cases have all recovered.

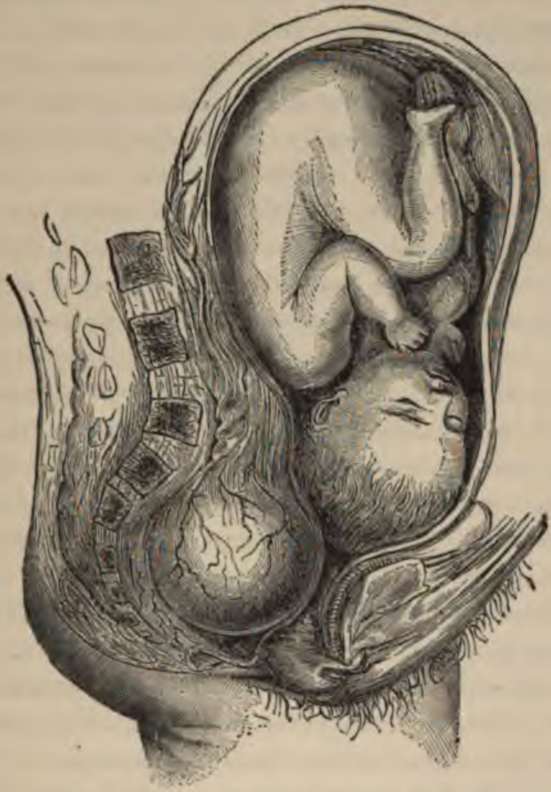


FIG. 142.—OVARIAN CYST OBSTRUCTING DELIVERY.

The Influence of the Cyst on the Puerperium.—Cases are on record in which women have died of exhaustion from the length of the labor, some days after delivery; incontinence or inflammation may occur. Rupture and inflammation of the cyst have been noted.

Diagnosis.—When the existence of tumors is unknown before conception, they may escape recognition after the uterus has become enlarged. If the cyst is small and is situated in the pelvis, the diagnosis may be established by the vaginal touch, as fluctuation will thus be detected. But, if the tumor is harder and more resistant, it may be mistaken for peri-uterine hæmatocele or a fibroid. It is only in the early months that it could be confounded with retroversion of the uterus. If pregnancy is recognized and is already advanced, the diagnosis in cases of intra-pelvic cysts may be very difficult. Such a cyst will distend the posterior fornix, rendering it so tense that the consistence of the tumor can only be imperfectly made out; however, as a rule, there is more or less distinct fluctuation, so that an hæmatocele alone could be mistaken for a cyst. But hæmatocele has never been observed during pregnancy, so the diagnosis is simplified accordingly. If the tumor is above the superior strait, the distension of the vaginal walls sometimes renders palpation very difficult, and the touch does not give much information; if the growth is in the false pelvis, it may be situated in front, or at the side of the uterus, the organ being more or less displaced, according to the size of the tumor. In exceptional cases a groove of separation can be recognized between the two tumors. Even where fluctuation is not obtained, the peculiar elasticity of the tumor, and its location to one side of the uterus, throw light upon the diagnosis; moreover, with the exception of hydramnios, ovarian tumors alone cause such distension of the abdomen. In hydramnios, prolonged palpation will usually establish the presence of uterine contractions, which are not present in the ovarian growth; puncture may be resorted to when a positive diagnosis is necessary.

Prognosis.—This depends absolutely on the size, location, and character of the tumor, and the operative procedure. Doumairon reports 41 cases, 25 mothers and 17 children surviving; Litzmann 56 cases with 24 maternal deaths; Jetter 215, with 64 deaths, and Playfair 56, with 23 deaths. During recent years the number of successful cases has somewhat increased.

Treatment.—Lomer lays down the following rules: 1. In labors complicated with ovarian tumors, interference should not be long delayed. 2. In all cases we should first try to reduce the tumor, resorting to puncture if this fails. 3. When the cyst-contents is too thick to flow through the canula, the cyst-wall should be freely incised. 4. All other operative procedures employed instead of evacuation of the cyst should be regarded as too dangerous, and should be rejected. 5. In the case of solid ovarian tumors, we have the choice between Cæsarean section and perforation. The decision will depend upon the peculiarities of the case and the conscience of the accoucheur.

According to Olshausen, the indications for interference during pregnancy are threatening asphyxia, intestinal obstruction, inflammation or rupture of the cyst, and twisting of the pedicle. Three courses are open to the obstetrician, premature delivery or abortion, puncture, and ovariotomy.

1. *Premature Delivery.*—This has been advised by Barnes, and has been adopted by Doumairon, but the latter only recommends it when the tumor is lodged in the pelvis, and has solid or semi-solid, contents, as in the case of dermoid cysts; if the growth is small, we should prefer premature delivery to abortion.

2 *Puncture.*—Spencer Wells greatly prefers this to the premature interruption of pregnancy, since by the latter method the child is sacrificed, and the mother's life is often jeopardized. When puncture is employed during the latter months or weeks of pregnancy, the relief experienced is often very marked; the procedure is usually free from the danger of wounding the uterus, which is only present when the pregnancy is unsuspected. It is especially indicated in cases in which the excessive distension of the abdomen causes dyspnœa and threatening asphyxia, or where abortion is imminent by reason of the pressure on the uterus. It may be necessary to repeat the puncture several times.

3. *Ovariotomy* has been performed several times during pregnancy by Marion Sims, Atlee, Wells, and others (9 cases); in one instance Wells accidentally punctured the gravid uterus, the patient being saved by Cæsarean section, and Hillas had a similar experience. Braün and Schroeder reported 14 cases, in 4 of which pregnancy was not suspected. In 9 or 10 cases the operation was performed in consequence of actual or threatening rupture or inflammation of the cyst. Pregnancy was interrupted in only four instances. [Quite recently, Mundé successfully performed ovariotomy at the fourth month of pregnancy without interrupting its course.—Ed.]

[Stratz has published a number of clinical observations in regard to the complication of pregnancy by tumors, the statistics of the Berlin Clinic for ten years being used. During this period there were nineteen cases of ovarian tumors, 14 of the women being saved by ovariotomy, and 3 of these subsequently aborted. Among 84 cases of ovariotomy during pregnancy, the mortality was only 9.5 per cent. He advocates strongly this operation in every instance, since the induction of labor sacrifices the child, and does not free the mother from the subsequent risks of ovariotomy, which are shown by the statistics quoted to be actually graver in the non-pregnant than in the pregnant female. Puncture of the cyst, he believes, offers no advantages over the radical operation, while it complicates the subsequent removal of the tumors.

These views we believe will fairly represent the opinion held by the majority of obstetricians on this side of the Atlantic.—Ed.]

In 1882 Cayla affirmed that ovariotomy may be performed during pregnancy under two very different circumstances: 1. When the condition of the cyst is such as to render us fearful that some accident may occur. 2. When some accident has occurred during gestation, sufficiently serious to make radical interference necessary. During pregnancy the accidents that may occur are rupture of the cyst, twisting of the pedicle, inflammation and suppuration. During delivery the cyst may rupture in consequence of the uterine contractions, during the second stage; finally, during the puerperium, inflammation and suppuration of the cyst may take place.

Heiberg divides the tumors, as regards treatment, into two classes, *viz.:* 1. Those that occupy the pelvis. In this case we should endeavor to reduce it from the middle of pregnancy on; if not successful, we should puncture if fluctuation is present, or perform ovariotomy if the former procedure is contra-indicated, otherwise premature labor may be induced. 2. When the tumor is abdominal, we should interfere if it developes rapidly, and causes severe pain. Ovariotomy should be resorted to during the first half of pregnancy, puncture during the second half. Never induce premature labor in these cases. Among 52 cases of ovariotomy during pregnancy, the uterus was punctured six times; the mortality in the remaining 46 cases was 15 per cent. for the mothers, and 50 per cent. for the children. In 18 of the operations pregnancy was not suspected. Olshausen says that there is no indication for interference during pregnancy, when the tumor is evidently a simple cyst of slow growth and not attended by much disturbance. A rapidly-growing cyst, which threatens to rupture, should be removed at once, unless it is firmly adherent, when it should be punctured. The pregnancy ought not to be interrupted except in those rare cases in which ovariotomy is impossible, puncture impracticable, and in which the irreducible tumor becomes a serious obstacle to delivery, that is in almost all cases of irreducible solid and dermoid cysts, located in the true pelvis.

During labor, we should also be guided by the same rule, to temporize as long as there is no immediate danger. But there is a method which we should always try, because it is very simple, and is generally free from danger—that is, the displacement of the tumor, especially when it is solid, to the side of the abdomen. If this does not succeed, we should try puncture through the vagina, or the rectum, the former being preferred. Ovariotomy during labor is not practicable, and the removal of the tumor through the vagina, as advised by Merrimann, would not give any better results; we must then resort to dilatation of the cervix, and interference with the forceps, version, cephalotripsy, and embryotomy, according to the cases, or the Cæsarean operation. Olshausen rejects the forceps, on account of the danger of rupturing the cyst, and prefers version to it, as being a little less dangerous. Litzmann reports 56 deliveries, 32 mothers and 7 children saved; in 10 cases, in which delivery was spontaneous, 5 mothers, and one child lived; in 7 in which the tumor was displaced, 6 mothers and 2 children survived. 13 out of 17 mothers were saved by embryotomy. Playfair has also collected 57 cases, in 13 of which delivery was spontaneous, resulting in the death of 6 mothers and 5 children; in all of the cases (9) in which puncture was resorted to, all of the mothers and two-thirds of the children were saved. 8 out of 15 women survived after embryotomy, 1 out of 5 after version, and 1 out of 2 in forceps deliveries.

IX. *Tumors of Various Kinds.*

Carcinomata, fibromata, and ovarian tumors are not the only ones that may become causes of dystocia, and there are a certain number of other growths that have opposed serious obstacles to delivery by obstructing, more or less, the pelvi-genital canal. Among these are carcinoma of the vagina, tumors of the Fallopian tube, (hydro-salphinx), fibroma, carcinoma, etc., of the pelvic cellular tissue, hæmatocele, hydatids, pelvic abscess, lithopædia, enchondroma, vaginal cysts and tumors of the rectum. With regard to these different varieties of tumors, Naegelé and Grenser remark, "these tumors have exactly the same influence on labor as ovarian cysts; their location is invariably the same, *i.e.*, between the vagina and rectum, and it is often difficult, or even impossible, to distinguish between the two kinds of tumors. However, the differential diagnosis is of no practical importance, except in so far as regards the question of extirpation, because the other indications are precisely the same. We empty the cysts by puncture or incision, according to the consistency of the contents, then leave the delivery to nature, or, if necessary, terminate it artificially. Large solid tumors sometimes leave no choice between extirpation, embryotomy, or Cæsarean section. Extirpation, although it is one of the gravest and most difficult of operations, is sometimes successful.

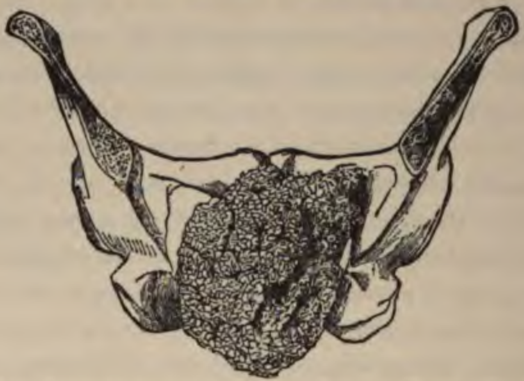


FIG. 143.—OSTEOSTEATOME OF THE PELVIC CELLULAR TISSUE. (*Lenoir.*)

X. *Rupture of the Uterus.*

Rupture during pregnancy, and especially at the beginning, is rare; after the fourth month the uterus is exposed to injury through the abdominal wall, and rupture then becomes more frequent. Sometimes rupture occurs spontaneously, under the influence of recent and acute uterine lesions; the affected regions sometimes become so soft that they are less resistant than healthy tissue, and yield to the least muscular effort, or to external pressure exerted upon the uterus through the abdominal wall; cicatrices from former lesions may yield in like manner. Blows, falls, etc., or even compression by *contre-coup*, are among the direct causes. Among recorded cases, we would note Corigue's case of wound of the uterus at the eighth month, Dionis at 6 months, Saxtorph at 7, Hohl at 5, Pigné at 8, Guèniot at 8, Geissler at 9. In 1868, Trask collected 12 cases of rupture of the uterus during the first six months with recovery, and 26 after the sixth month with death in many of the instances. [Since Trask's report, the instances have multiplied to such an extent that it is impossible as well as unnecessary to cite them.—Ed.]

The symptoms of rupture vary somewhat according as the accident takes place during the first four months of pregnancy, or after that time. In the former case the woman has a severe shooting pain in the lower part of the abdomen; at the same time a tearing sound is heard within the belly, the face becomes pale and is bathed in cold perspiration, the pulse is rapid and feeble; hiccough, vomiting, convulsions and syncope appear, the abdomen becomes distended, hard and tender, the cervix is hard, and there is usually no external hemorrhage. The woman usually dies soon after the occurrence of the rupture, or she may succumb to subsequent peritonitis. From the fifth month on, the first symptoms after the accident are the same as in the former case, but, as the child often escapes into the abdominal cavity, special symptoms result. Aside from the fact that there is always hemorrhage in these cases, the shape of the abdomen becomes altered, the fœtal parts are felt, and the movements are often seen; by the touch changes are noted in the condition of the cervix and in the shape of the uterus. Finally, in wounds of the uterus, we find escaping from the wound blood and amniotic fluid, and in some instances the rent has been large enough to permit the escape of the entire fœtus. Trask has only collected 12 cases of recovery.

II. *Ruptures during Labor.*

These may be complete or incomplete, according as they involve the entire thickness of the organ, or only extend to the peritoneal covering; they may extend to the vagina. It is only when they extend beyond the os internum that they become serious. They may be spontaneous or in consequence of obstetrical manipulations; the former are of most interest to the obstetrician, because the latter are nearly always preventable. Opinions vary regarding the frequency of this accident. The average percentage, as estimated from the statistics of upwards of 30 different writers, and representing over 3,000,000 cases of labor, was 1 in from 2000 to 4000. In 573 cases of rupture, Jolly found that 376 were spontaneous, and 197 traumatic.

Causes.—These are predisposing and determining. Most authors admit the influence of multiparity. Among 1164 cases of rupture collected by various authorities, 616 occurred in multiparæ. In consequence of child-bearing the uterine walls are softened, fatty degeneration resulting from repeated pregnancies, with consequent weakening of the power of the uterus, prolongation of the labor, and (according to Scanzoni), greater frequency of trunk-presentations.

Duration of Labor.—Simpson's statistics show that when labor extended beyond twenty-four hours, there was one case of rupture in 38, but when it lasted only 6 hours, there was but one case in 2000. Trask found the mean duration of labor in 57 cases of rupture to be 21 hours and 6 minutes.

Contraction of the Pelvis.—Trask noted the presence of contraction in 74 per cent. of 300 cases of rupture. The accident seems to be more common where the contraction is only moderate, as when the narrowing is excessive the cervix is always above the brim of the pelvis, and, as the fœtal part can not engage, there is no chance for compression of the uterus against the bone. Rupture is said to occur more frequently with male infants.

Thinning of the Uterine Wall.—This was noted by Trask in 14 out of 49 ruptures; by Wilmart, in 21 out of 100. Softening from metritis, fatty degeneration, malignant disease, etc., is another cause. Cicatrices in the uterine walls, from former wounds, Cæsarean section, etc., have been noted in some cases. Rigidity of the cervix, uterine tumors, etc., may be causes. Hydrocephalus in the fœtus was noted as a cause by Keith in 16 cases out of 64, by Bandl in 2 out of 13, by Hohl in 5 out of 77. Excessive size of the fœtus was a cause in 10 out of 63 cases reported by Kormann. Presentations of the shoulder are especially unfavorable; they were observed 14 times in 84 cases. Unusual development of the fundus uteri, and malformations of the organ have given rise to the accident. The immoderate use of ergot is a fruitful cause.

Traumatic ruptures are mostly due to blows and to version. Among 197 cases of traumatic rupture, 71 followed version, 37 the employment of the forceps, 10 cephalotripsy, and 30 other unwise manipulations. Many writers claim that rupture may take place before the membranes are ruptured.

Pathological Anatomy.—Location.—The posterior wall of the inferior segment is the most common locality, and next to this the lateral walls, especially the left. The rupture is usually single, but may be multiple; there may be simply a perforation of the uterine tissue, but more commonly the lesion presents a considerable extent (3 inches and more); sometimes the uterus is almost completely detached from the vagina, or the rent may extend from the inferior segment to the fundus, involving also the cervix, vagina, rectum, or bladder. As a rule the peritoneal layer is not involved, being merely detached by the extravasated blood;

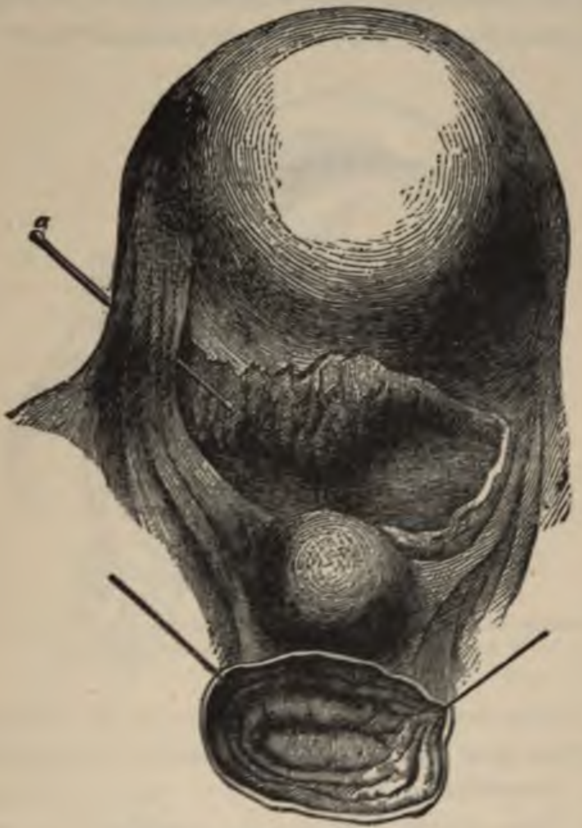


FIG. 144.—RUPTURE OF THE UTERUS.

rarely the peritoneum is torn, while the other layers are intact. The fœtus may remain in the uterus or escape into the cavity. The rent may be vertical, transverse, or oblique, generally with irregular edges. The blood escapes into the abdominal cavity, and spreads beneath the peritoneum.

Mode of Production.—Three theories have been advanced: according to the first, the uterine contraction is the sole cause of the rupture, while the second refers the accident to obstetric manipulations, and according to the third rupture is due to the compression of the uterine tissues between the fœtal head and the pelvic wall, thus producing softening and gangrene. According to Bandl's theory the cervix retracts above the fœtal head after complete dilatation, this retraction being produced by the combined muscular contraction and the elasticity of the tissue. In primiparæ, during the stage of dilatation, there is the greatest development of the uterine force for the purpose of expelling the child. The external muscular layer in contracting both exerts a concentric action on the contents of the uterus, and tends to draw the uterine wall upwards over the fœtal ovoid. The concentric pressure then tends to engage the child in the cervix, and it is only when the cervix is greatly distended

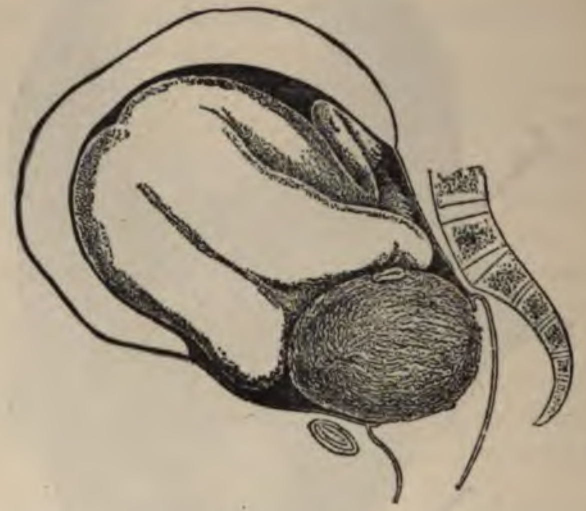


FIG. 145.—DISPROPORTION BETWEEN THE BODY OF THE UTERUS AND THE CERVIX IN PRESENTATION OF THE VERTEX. THREATENING RUPTURE TO THE LEFT.

by the fœtal part that the second factor becomes active, that is to say, the elasticity of the cervix, which causes it to retract above the head. When there is no obstacle offered to this ascension of the cervix, there occur in primiparæ only those small, insignificant lateral tears which are observed in the portio vaginalis, and which may sometimes be entirely absent. When the relations between the head and the pelvis are not quite normal, delivery is somewhat more difficult, and the lacerations of the cervix are deeper. As a rule the anterior wall of the cervix is, so to speak, imprisoned between the head and the pelvis, at a level more or less elevated, and the head in descending pushes the cervix downwards and distends it at that point which we see appear at the vulva as a bluish or reddish swelling. More extensive tears sometimes take place in this case, especially where small ones existed before, because, as the head is forced downward, and the muscular contraction acts in an upward direction, both forces act upon the cervix, the posterior wall of which is already retracted over the head, while the anterior is still impacted. Bandl has

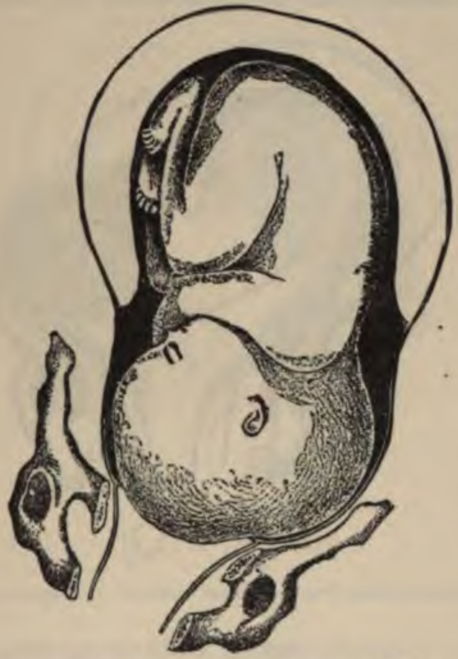


FIG. 146.—DISPROPORTION BETWEEN BODY AND CERVIX OF THE UTERUS IN A CASE OF HYDROCEPHALUS.

often observed under these circumstances lacerations of the cervix, involving one-half of the cervix and the internal layers of the same, without causing the death of the women. These lacerations may also be produced when the fœtus is extracted after version, especially in cases of contracted pelvis.

Rupture of the Cervix.—Fatal ruptures are usually spontaneous, and only result when by reason of the contraction of the pelvis, the excessive size of the head, or its failure to engage, delivery is retarded, and the cervix is greatly distended above the pelvic brim. Rupture takes place when the os internum is situated obliquely above the superior strait, or when it has ascended in such a marked manner that the uterus envelopes the fœtus like a hood. (Figs. 145 to 148.) As soon as this condition of affairs exists, the uterus does not tear, as it is extremely difficult for it to rupture, no matter what operative manœuvre may be undertaken. At any instant, however, the cervix may rupture in consequence of either a strong contraction or operative interference; but version is especially liable to lead to rupture, an accident that may happen to the most skillful accoucheur, if he fails to recognize the condition of affairs, or interfere in spite of them. In primiparæ, as long as the head remains high up, the uterus contracts for many hours without deviating from its normal posi-

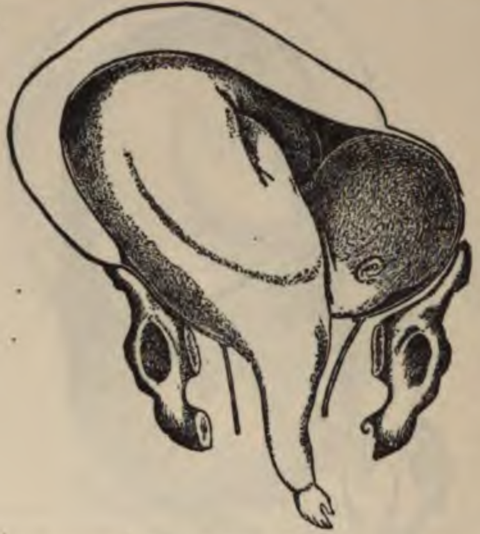


FIG. 147.—DISPROPORTION BETWEEN BODY AND CERVIX UTERI IN PRESENTATION OF THE SHOULDER.

tion. It is only when its force has been exercised for a long time to no purpose, that the abdominal muscles cease to contract, and can not in consequence fix the uterus at the level of the superior strait; all the effect of the contraction then becomes confined to the cervix. The body and fundus of the uterus tend to ascend higher and higher above the head and body of the fœtus; the elastic cervix, consequently, becomes excessively distended and is impacted between the head and the brim. This condition is rare in primiparæ, hence the infrequency of rupture. In multiparæ the distension of the cervix will take place sooner, and in consequence the conditions will also be present that favor rupture. Bandl's theory can really be summarized as follows: Whenever a moderate obstacle (contracted pelvis, transverse presentation) is opposed to the expulsion of the fœtus, the uterine contractions, persisting in the body of the organ, and being no longer counterbalanced by the resistance of the surrounding parts and abdominal muscles, will act directly on the cervix. The os internum will be drawn above the superior strait, over the fœtal part, and the uterus will be divided into two portions, the upper being formed by the fundus and body, and the lower by the cervix, in which the fœtal part will be more or less engaged. These two portions will be separated by a groove, formed at the level of the os internum, which will

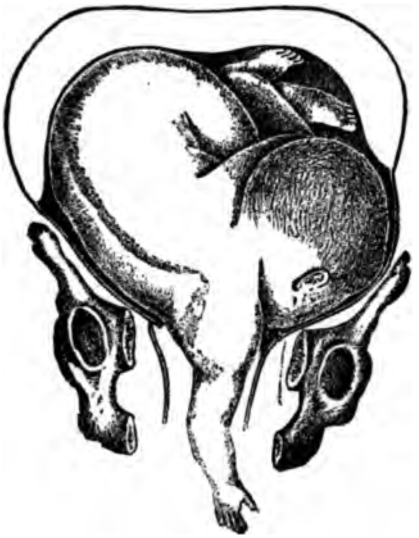


FIG. 148.--DISPROPORTION BETWEEN THE BODY AND THE CERVIX IN PRESENTATION OF THE SHOULDER.

become more and more apparent at each contraction. While the body and fundus will tend to become thicker and smaller, the cervix, on the contrary, will become more and more distended, and will become thinner in proportion to this distension. It is evident, then, that the latter portion may become so thin that at a given time it may rupture, this rupture beginning at the cervix, and extending upwards until it affects the tissue of the corpus uteri. (Figs. 145 to 148.)

Symptoms.—Rupture usually takes place suddenly during the expulsive stage, and without any previous warning. During a contraction, or some obstetric manœuvre, the woman is seized with a sudden agonizing pain, which differs entirely from that which accompanies labor; the pain is accompanied by a sensation of tearing and sometimes by a dull sound, appreciable to the bystanders, as well as to the patient herself. If the wound is sufficiently large to permit the escape of the child into the abdominal cavity, she has a sensation of displacement. The uterine contractions cease, either at once or quickly, and the intermittent pains are succeeded by a steady pain in the lower part of the abdomen. At the same time the facies is altered, and becomes pale, the skin is bathed in cold perspiration, the pulse becomes small and imperceptible, and attacks of syncope ensue, accompanied by nausea and vomiting. Then appear dyspnœa, ringing in the ears, and convulsions. The shape of the abdomen is changed, the uterus is extremely sensitive on pressure, and, if the child has escaped into the abdomen, the fœtal parts are clearly felt through the abdominal wall. Then the belly becomes tympanitic, blood escapes from the vulva, either pure or sanious, according to the time that has elapsed since the occurrence of the accident. On examination it will be found that the part which presented at the superior strait has either disappeared or has been replaced by another, while on the introduction of the hand, or even the finger alone, the site of the rupture may be detected, and thus the diagnosis may be established directly. Sometimes a deceitful calm succeeds this grave condition, while at the same time a mild sensation of heat is diffused throughout the abdomen, but the alarming symptoms soon reappear, and death ensues either rapidly, or more slowly, from consecutive peritonitis.

According to Jolly, among 580 cases of rupture, the contractions ceased in 256, there was external hemorrhage in 148, collapse in 179, vomiting in 147, retraction of the presenting part in 146, and abdominal pain in

133; the fœtal limbs could be felt through the abdominal wall in 77 cases.

There are certain other signs that deserve attention, *viz.:* a tearing sound, heard by the patient and bystanders, violent movements of the fœtus, followed by sudden cessation of the heart-sounds, and change in the shape of the abdomen, the uterus and the escaped fœtus each forming a tumor, with a furrow between them. Several writers have called attention to the development of fluctuation and emphysema. Hemorrhage is constant, and may be internal, external, or mixed; if it is purely internal, it sometimes escapes recognition. At other times the blood collects at one point, and forms a hypogastric tumor. According to Hervieux, the loss of blood will be slight when the distension is confined to the cervix and its vicinity, where there are few vessels, when the fœtal part is so engaged in the wound as to compress the vessels, and when the entire contents of the uterus has escaped into the abdomen, thus allowing the organ to retract completely. The hemorrhage will be profuse if the rupture occurs at the placental site, so that the placenta is stripped off, and if the uterus is in a state of inertia. In some instances, symptoms are absent, and the rupture may not be recognized, as in 37 cases collected by Jolly. But there are unusual phenomena which awaken suspicion, such as fixed pain, vomiting, recession of the presenting part, and sudden or gradual cessation of the contractions, that are not explained either by the course of the labor or by the general condition of the patient. But there are many cases in which the presentation is not altered, and the uterine contractions continue. Labor has sometimes proceeded, in spite of the rupture, until the child was expelled spontaneously. The persistence of the contractions has been explained in various ways, some believing that the pressure of the fœtus continues to irritate the uterus until it is expelled, after which the organ lapses into a condition of inertia, others affirming that the wound is the determining cause of the contraction, as long as it is not too extensive, while Tyler Smith thinks that the child is expelled by the same contraction that ruptures the uterus. The latter theory may apply to tears of the vagina and perineum, but not to those of the uterus. Bandl has given the true explanation of the mechanism in most cases, that is, where the rupture begins at the cervix and extends to the body.

Prognosis.—This is extremely grave for both the mother and the child, especially so for the latter, when it escapes into the abdomen. Franqué reports 26 fœtal deaths in 26 cases, Ramsbotham 217 deaths in 237 cases. Scanzoni explains the fatal result as due to the loss of blood, as well as to the severe nervous shock experienced by the mother, and by the strangulation of the cord or important parts of the fœtus, in the retracting wound. The prognosis for the mother is less grave. 100 women recovered out of 580 cases collected by Jolly, 63 being saved out of 88 in which the child had escaped into the abdominal cavity.

Treatment.—Three courses are presented to the obstetrician, expectation, extraction *per vias naturales*, and gastrotomy.

1. *Expectant Treatment.*—This has been almost entirely abandoned at the present day, except in the case of rupture occurring during the early months of pregnancy; but, as soon as the pregnancy has advanced to the sixth month, the extraction of the fœtus is positively indicated, especially if it is living. Out of 144 cases left to nature alone, 142 died, while out of 154 women who were delivered by artificial means, 57 were saved.

2. *Extraction per vias naturales.*—This is the usual procedure, and almost the only one adopted in France. If the child remains within the uterus, with the head presenting, delivery should be effected with the forceps or cephalotribe, according as the pelvis is normal or contracted; if these fail, version should be practised. In 75 forceps deliveries, with or without previous crushing of the head, 13 mothers were saved, in 85 versions 15 were saved. If the child is partly or wholly outside of the uterus, Baudelocque advises the use of the forceps, if the wound is large and the pelvis normal; he reports 1 cure in 12 cases. Ramsbotham advises version, and reports 45 cases with 33 deaths. If the wound is large and the pelvis narrow, we may resort to the forceps or to cephalotripsy; it is better to perform version and to puncture the head after it has been fixed. If the child is alive, gastrotomy is indicated; also when the child is partly outside of the uterus, and the wound has retracted, and extraction can not be effected without employing great violence or enlarging the wound with a blunt-pointed bistoury. Gastrotomy is the only resource where the entire fœtus has escaped into the abdominal cavity, and it is impossible to extract it *per vias naturales*, by reason of the contraction of the pelvis, the retraction of the wound, or uterus, or the resistance of the cervix; the fœtus must first be extracted, then the clots and placenta. But if the extraction presents too many difficulties, it is better to leave

the placenta to be detached spontaneously later. The statistics presented by Trask and Jolly appear to indicate that gastrotomy is the operation that gives the most successful results, the mortality, according to the former, being 24 per cent. as compared with 68 per cent. after version, and 38 per cent. after natural delivery. Jolly estimates the cures by gastrotomy at 68.4 per cent., by version at 23 per cent., and after the use of the forceps 12 per cent. The time to interfere is as soon after the accident as the condition of the woman permits, and we must afterward guard against peritonitis, by keeping the woman for some time under the influence of opium, administered in full doses.

[Dr. Malcolm McLean, of New York, has recently reported a case of partial rupture of the uterus, where he was able to perform podalic version. All of the child had escaped from the uterus except the head and one arm. The mother recovered, notwithstanding the formation of a large hæmatocele to the right of the uterus.

McLean lays stress on the fact that in the above case the fœtal envelopes remained unruptured and thus protected the peritoneum from contact with liquor amnii, etc.—Ed.]

XII. *Ruptures and Lacerations of the Vagina.*

The vagina, as well as the uterus, may rupture spontaneously, or may be torn by the introduction of the hand, or by splinters and fragments of bone; the tears may be situated at the upper, middle, or lower part of the vagina. Those affecting the fornix, when very extensive, are often associated with rupture of the uterus, give rise to the same symptoms and call for the same treatment. Ruptures of the fornix, especially when spontaneous, are usually transverse, and the vagina may be entirely detached from the uterus. As in ruptures of the uterus, these tears may allow the complete or partial escape of the fœtus into the abdominal cavity, but they are more frequently accompanied by prolapse of the intestine. When the tears occur at the middle or lower part of the canal, they often escape notice during labor, and are only recognized after the expulsion of the fœtus. Although frequently fatal, they may, however, result favorably, even when the fœtus has escaped into the abdomen. If not immediately fatal, they may cause para- and perimetritis, suppuration, more or less extensive gangrene, and consequent fistulæ. Finally, lesions of the vagina not infrequently result in consequence of prolonged pressure, whence vesico- and recto-vaginal fistulæ.

The child may usually be extracted *per vias naturales,* and hemorrhage becomes the accident that demands immediate attention. Injections and tamponing being naturally contra-indicated in these cases, we must be content with cold applications. In rare cases gastrotomy is advisable, as a last resort. Tears of the mucous membrane are usually of little importance, and only require astringent and antiseptic injections.

Ruptures of the vagina, although grave, are not by any means always fatal. Danyau records 4 recoveries in 17 cases, and McClintock in 51 cases, 13 recoveries.

XIII. *Puerperal Hemorrhages.*

Under this head are included all hemorrhages that may occur in the pregnant woman, from the cessation of the menses to their reappearance—in short, hemorrhages during pregnancy, labor, delivery, and the puerperal state. The following varieties are to be distinguished:

1. Hemorrhages during the first six months of pregnancy, or before the fœtus is viable, which lead to abortion.

2. Hemorrhages during the last three months, including those that occur during labor, which are invariably due to placenta prævia. They often compromise not only the existence of the pregnancy, but that of the mother and child.

3. Hemorrhages during the third stage of labor.

4. Secondary hemorrhages, occurring several hours, or days, after delivery, and sometimes representing a return of the menses with too profuse flow.

1. *Hemorrhages during the first Six Months.*

We shall consider these briefly, referring the reader to the chapter on "Abortion."

Causes.—The primary cause is pregnancy itself, which leads to general pelvic congestion, as well as to the various disturbances already mentioned at length. Two distinct conditions may exist, anæmia and plethora, both of which may lead to practically the same result; the former is really a serous plethora, while the latter, which is rare, is so to speak an active plethora. We must also bear in mind the peculiar alteration in the blood that occurs during pregnancy. Under these different influences congestion may be produced, which leads to hemorrhage. But the menstrual congestion is also an active factor, especially during the early months of pregnancy; conception causes suppression of the monthly flow, but slight losses of blood are sometimes observed, especially during the first three months, which, on account of their coincidence with the usual time at which menstruation appears, seem to be related to that function. Numerous cases are on record in which women have menstruated throughout pregnancy; Elsæsser alone has collected 50 examples. *This is not true menstruation,* since the hemorrhage differs in quantity or quality, and would not be connected with the normal flow except for the coincidence in its appearance.

Changes in the uterine mucous membrane or in the placenta constitute another cause of hemorrhage. The turgescence of the mucosa, which is present from the moment at which the ovum reaches the uterus, is in itself a predisposing cause. During the third and fourth week the new utero-placenta vessels are so delicate that the slightest violence may separate them and cause bleeding. After the second month the vessels are still larger, so that an injury or a sudden increase of the blood-pressure may cause rupture of a vessel and extensive extravasation. When the blood is effused in large quantities, it either collects about the seat of rupture, until the hemorrhage gradually ceases, or it extends to the os and escapes from it profusely and for a longer or shorter period. Again, the blood infiltrates the placenta and undergoes secondary changes (placental apoplexy, or hæmatoma.)

The hemorrhage may be of a venous nature, induced by obstruction of the vena cava inferior.

The causes may be summarized as follows: menstrual congestion, venous stasis (from general or local causes), mental shocks, straining, direct or indirect violence, imperfect development or attachment of the placenta, or separation of the same, inflammations or morbid growths of the uterus, acute febrile diseases, chronic toxic affections (syphilis, plumbism), the use of abortifacients, diseases of the fœtus or placenta, and finally abortion. [To these causes should be added the distinctive factors, erosions of the external os, lacerations of the cervix, mucous polypi, tumors of the cervix, intemperate coitus.—Ed.]

Diagnosis.—As soon as we have ascertained the cause of the hemorrhage, we have made the diagnosis. Erosion of the cervix is a very common cause of bleeding; it is usually confined to the posterior lip, and extends up the canal, and its origin is commonly referred to laceration of the cervix from a previous confinement, whether it terminated spontaneously or artificially. The discharge from the eroded surface is often hemorrhagic, but as these erosions often cause abortion, the apparent may give place to real bleeding. The important point to decide is, when does a hemorrhage signify impending abortion, and when we are called to a case in which bleeding has continued for some time, does this bleeding result from a complete, or from an incomplete abortion? The treatment of these cases will be governed not only by our wish to preserve the ovum, but to guard the woman against both present and future harm. Abortion does not necessarily follow hemorrhage, and every obstetrician has observed cases in which neither the mother, nor the child, was injured by long and profuse bleeding.

Treatment.—See chapter on Abortion.

II. *Hemorrhage during the last Three Months of Pregnancy, and during Labor.—Abnormal Insertion of the Placenta.*

What is abnormal insertion of the placenta? Portal (1685) was the first to show that the placenta might be inserted in the inferior segment, and over the os, and this was confirmed by numerous subsequent writers; but Baudelocque (1824) was really the first one to affirm that the fundus uteri was its normal site. Authorities differ as to its exact insertion, Scanzoni placing it on the right postero-lateral wall, Naegelé and Siebold on the left, Credé and Spiegelberg at the right upper angle of the uterine cavity, Carmichael at the inferior part of the posterior wall. Hegar affirms that it is attached most frequently to the posterior wall, and Gusserow (from 188 observations) adopts the same view, in which he is joined by Schroeder and Bidder. Hennig (651 cases) found the placenta inserted in the superior uterine segment in 11 per cent.

In order that its insertion may be abnormal, the placenta must not only be attached to the lower segment, but it must be near the os, or rather, must partially, or entirely, cover it. Several varieties exist, *viz.:* 1. The placenta is inserted completely over the cervix, so that the os is entirely covered (*total or central placenta prævia*). 2. The placenta is inserted at the lower segment, and over the cervix, so as to partially cover the os (*partial*). 3. It is inserted at the lower segment, so near to the cervix, that it slightly encroaches on it (*marginal*). Some authors (as Barnes) describe an intra-cervical insertion, which is rejected by Duncan and others. Marchal describes two varieties of "cervical pregnancy," one in which the ovum enters the cervix as soon as it reaches the uterus, and developes there, and the other in which the ovum developes in the cervical cavity, and, after it has reached a certain size, passes into the cavity of the uterus, and there continues its growth; in the latter case the ovum is attached to the fundus by a pedicle sufficiently long to allow it to enter the cervix. Various local disturbance, hemorrhage and abortion, usually result from this abnormal condition. Several cases of this nature have been reported (five well authenticated). Marchal concludes: secondary cervical pregnancy is admissible, the ovum being attached to the fundus by a long pedicle formed from the decidua serotina, which allows its growth to continue; but no case is on record in which a new placenta has been formed in the cervical cavity. Primary cervical pregnancy is doubtless extremely rare. Wenzel has even sought to prove that complete central insertion of the placenta is impossible; it is certainly very rare, but well-authenticated cases have been reported. As a rule, only a portion (the smaller portion, according to Martin) of the placenta covers the os. Among 57 cases of this kind, it was inserted 44 times on the left and 19 times on the right side; among 84 cases of marginal implantation, it was 50 times on the right side and 34 on the left. Among 260 cases collected by various writers, 86 were examples of central and 165 of marginal insertion. Muller's statistics, founded on 1411 cases, are different, showing 747 cases of central to 715 of marginal insertion, 31 of the women in the former and 59 in the latter case being primiparæ.

Pathological Anatomy.—Placenta prævia differs from the normally inserted placenta in its form, as well as in the character of its tissue. While the latter has an average weight of between 16⅔ and 20 ounces, a thickness of an inch, and measures about 7⅓ inches in its greatest diameter, the former at term weighs hardly 16⅔ ounces, and does not exceed ⅔ inches in thickness. In most cases, a placenta prævia is extremely thin, and is elongated rather than oval in shape. The portion which presents is often dark red, and is thus distinguished from the rest of the placenta, which is pale and anæmic. As the placenta approaches the os the villi become small and scattered, and the portion corresponding to the cervix, or its vicinity, is the softest of all. It is not rare to see part of it transformed into connective-tissue, or undergoing fatty degeneration, whence arise isolated cotyledons (placenta succenturiata); or it may spread out in such a way as to cover nearly the whole of the internal surface of the uterus. On examining the placenta, we usually find the cotyledons at the edge of the os flattened, and the placental tissue reduced to a sort of lamella, and heaped upon itself, as it were; under the microscope we recognize fibrous metamorphosis and fatty degeneration of the cells of the villi. Apoplectic spots are frequently seen. The cord has usually a central, often a marginal insertion. Gendrin describes the changes in the placenta as consisting of a general softening of the tissue and its conversion into a homogeneous, reddish mass, which resembles the dependent portion of a congested lung, but is as fragile as the spleen. This change takes place when hemórrhage has occurred some time before, or during, parturition. In the zone adjacent to the central portion the placental tissue is condensed and is reduced to a dense, granular, homogeneous mass, of a yellow color, very fragile, and traversed by whitish filaments. In the midst of the tissue are small clots, which are intimately connected with the surrounding substance. The surface of the placenta, over the portions thus altered, often presents numbers of small, white spots, slightly projecting, and resembling at first sight tubercles on the peritoneum in tuberculous peritonitis. The zone external to the one just described presents a reddish tissue, in which is blood that has become coagulated and even incorporated with the placental tissue; this tissue itself is much softer and more friable than normal. The appearances differ according to the age of the changes, those near the centre of the placenta being most ancient and corresponding to the early hemorrhages. Aside from these alterations, lesions are produced in the placenta at the moment of expulsion; these appear as lacerations filled with coagulated blood, the ruptures radiating from a central point, as when a fragile body is crushed in the hand.

Frequency.—Muller reports 813 cases of placenta prævia among 876,432 cases of confinement (1 to 1078), the greatest number occurring in patients between the ages of 30 and 35, the smallest between 13 and 19. 1347 out of 1574 women (observed by various authors) were multiparæ; among 691 cases collected by Muller, 134 were primiparæ, 114 II-paræ, 70 III-paræ, 78 IV-paræ, 54 V-paræ, 42 VI-paræ, 48 VII-paræ; 24 XI-paræ, 6 XIII-paræ, etc. In general, causes that induce enlargement of the uterus favor abnormal implantation.

Various explanations are offered to account for cervical implantation, such as the mobility of the uterus, the position of the woman during fecundation, the weight of the ovum (!), obliquity of the uterus, etc. Some affirm that the decidua developes at such a point in the cavity, that the ovule is attached abnormally when it reaches the cavity. Carmichael thinks that the placenta may become displaced from its normal position, through the general expansion of the uterus, and be pushed downwards and backwards. Schroeder admits that increased size of the uterine cavity, and an abnormally smooth condition of the mucosa, may favor abnormal insertion; increase in size is most frequent in multiparæ, smoothness of the lining membrane is produced by previous leucorrhœal discharges.

Symptoms.—They almost never appear before the sixth or seventh month. Nearly all authorities agree on this point, that a hemorrhage which appears for the first time at this period, depends almost invariably on abnormal insertion, and, according to Naegelé, it begins so much the sooner, according as the placenta covers the os more or less completely. When the implantation is marginal, hemorrhage may not occur until the end of pregnancy, or even the beginning of labor. Among 1,121 cases hemorrhage took place before the sixth month in 34, between the sixth and seventh in 53, during labor in upwards of 75. This hemorrhage appears *suddenly, without previous symptoms,* often during the night, when the patient is asleep or perfectly quiet. Rarely she has colicky pains, or a feeling of discomfort in the loins for a few moments before the flow. The hemorrhage is always *external,* beginning gradually, and soon becoming more profuse, until a large amount is lost. It soon ceases, as it began, without apparent cause. The blood has sometimes a venous, sometimes an arterial hue, and has a marked tendency to coagulate. The flow ceases and may not return for from eight to fifteen days, or even longer; the patients have no special symptoms during the interval; then another hemorrhage occurs, as in the first instance, without appreciable cause, but more profuse and continuous than before. These phenomena may be repeated until labor begins, when the bleeding becomes so extensive as to place the woman's life in real danger. *Intermittence* is the distinguishing characteristic of the hemorrhage; anæmia, swelling of the face, general œdema, attacks of syncope, sometimes chills, fever and convulsions are accompanying symptoms. The blood may collect to some extent in the interior of the uterus, but it is essentially external in character. Ballottement is absent in cases of placenta prævia, as the inferior segment is so much thickened by reason of the attachment of the placenta to it that the finger can not reach the fœtal part. The presentation is often faulty. Thus Simpson records 21 transverse presentations among 90 cases of placenta prævia, and Muller 272 among 1148.

When labor begins and the cervix is sufficiently dilated to allow the finger to be inserted, the diagnosis is no longer doubtful. We feel at once the thick, rugose membranes, or even the edge of the placenta, easily recognized by its lobes and irregularities; great gentleness should be used during the examination, for fear of increasing the hemorrhage. Another sign is only observed after labor has begun, *viz.:* In accidental hemorrhage the flow always stops during the contraction, but in abnormal insertion, on the contrary, it continues in the interval between the contractions, and increases during each pain, as long as the membranes are intact.

Mechanism.—Portal and Giffard attributed the hemorrhage to the dilatation of the cervix, and consequent laceration of the veins. Levret was the one who first advanced a true theory of this accident. The cervix, according to him, sharing during the latter months of pregnancy in the enlargement of the rest of the uterus, grows away from the placenta, which thus becomes detached, whence the early hemorrhages that inevitably recur during labor, because of the opening and dilatation of the cervix. This theory, though generally adopted, was based on erroneous observations, and it was necessary to find another. Stoltz showed that the cervix remained absolutely intact up to the last weeks, or even days, of pregnancy, and could not by expanding give rise to the hemorrhage. Jacquemier affirmed that when the placenta was inserted over the os, its separation during the first half of pregnancy was prevented in part by its growth, which is at first very rapid, but later it becomes so stretched, that partial detachment occurs, whence the hemorrhage during the fourth, fifth and sixth months. But when the mechanical distension of the lower uterine segment is added to the enlargement of the placenta, causing it to project more or less into the pelvic cavity, the tearing increases to a very marked degree, and often results in separation of a portion of the placenta. Hence the increasing frequency of hemorrhage during the seventh, eighth, and a part of the ninth month, although the os is just as much closed as it was when bleeding first took place. Levret's explanation applies later after labor has begun; then dilatation of the cervix is the real, active cause. This theory has been attacked of late years by two authorities—Barnes, who admits that the blood comes from the uterus, and Simpson, who thinks that it is derived mostly from the placenta. The latter affirms that if the exposed uterine vessels contribute to the hemorrhage, it is only to a limited extent, and that most of the blood is derived from the placenta. Hence, at each escape of blood, a portion of the placenta is obstructed, and prevents further access of the maternal blood at the detached side; the hemorrhage accordingly ceases as soon as the placenta is completely separated. This view is incorrect, since the blood comes from the uterus, and not from the placenta, as has been proved by all observers, in cases in which the bleeding continued after the expulsion of the placenta.

Barnes offers the following explanation: In common with Stoltz, he believes that the first hemorrhage is due to excessive development of the placenta, as compared with that of the cervix. Under the influence of the monthly congestion the uterus and placenta are engorged with blood, and the latter swells and becomes too large for the surface to which it is attached; it becomes separated at the edges of the os and the blood pours out. Then, in consequence of the irritation which this partial detachment produces, the uterus contracts, and thus a still larger portion of the placenta is separated, but this separation is always confined to the cervical zone. The strong contraction of the uterus is the true cause of the cessation of the hemorrhage. Barnes divides the internal surface of the uterus into three zones (Fig. 149): The *superior polar circle or fundus*, which is free from danger; the *middle zone*, attachment of the placenta to which occasions risk of post-partum hemorrhage; and *the inferior or cervical* zone or region of danger. Any portion of the placenta inserted in the latter may be detached prematurely, because the os must enlarge to give passage to the child, and this enlargement does not allow the placenta to remain fixed. As long as the separation does not extend to the border of the cervical zone, the hemorrhage continues; as soon as this limit is reached it stops, if the uterus contracts strongly. Now, according to him, there are two things that prevent contraction, the fact that the uterus has not reached its full development, and the diminution of the vital force in consequence of loss of blood. Barnes affirms that the cervix dilates slowly in these cases, but it is not because it is rigid and resistant, but rather because the uterine contractions continue for a long time to be feeble and irregular. In the 15 or 16 cases observed by me, I have never been able to demonstrate this so-called anatomical resistance of the cervix, which he describes.

There are thus two theories: In the one the blood comes from the placenta and its vessels, and which is not admissible as an exclusive theory; in the other the blood comes from the uterus, according to certain authors during labor, and according to Barnes the hemorrhage necessarily ceases when labor has progressed to a certain extent.

Legroux's conclusions (1855) express the same idea, *viz.*: Hemorrhage due to separation of the placenta takes place during repose of the uterus, but ceases when the organ contracts, and does not recur if the contraction is permanent. The hemorrhage is almost entirely uterine, the placenta contributing only a small share of the loss, which may affect the life of the child, but not that of the mother. It becomes entirely uterine after the death of the fœtus.

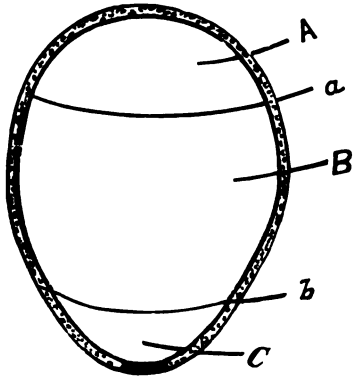


FIG. 149.—A, Fundal zone. *a*, Superior polar circle. *B*, Middle zone. *b*, Inferior polar circle. *C*, Inferior or cervical zone.

Matthews Duncan believes that hemorrhages from placenta prævia during the last three months of pregnancy are often unaccompanied by separation of the placenta, although this doubtless takes place in some cases. Hemorrhage in his opinion may occur in four ways: 1. By the rupture of a utero-placental vessel, at the border of the os internum. 2. By the rupture of a marginal utero-placental sinus in the area of spontaneous detachment, in partial implantation. 3. By the partial separation of the placenta in consequence of traumatism. 4. By its partial separation from uterine contractions, which cause slight dilatation of the os. Spiegelberg adopts this view.

4. *Hemorrhages during Labor.*

All authorities agree that hemorrhage during labor is inevitable in cases of abnormal insertion, and they attribute it to separation of the placenta. Jacquemier says if labor sometimes proceeds without accidents in these cases, it is because the placenta was either completely detached, or at least it was so attached that dilatation proceeded without separating it any further. Moreau's theory that hemorrhage ceases after the death of the fœtus is negatived by many facts. Most writers believe that the hemorrhages increase at the return of each pain; Barnes, Jüdell and myself, adopt this opinion. Duncan says that the uterine contraction diminishes the calibre of the vessels, and thus diminishes the hemorrhage; Schroeder believes that the uterine wall glides away from the placenta during the dilatation of the cervix, as long as the membranes are intact, but after they are ruptured the placenta can follow the uterine wall in its movement of ascension, and there is no danger of separation.

What is the source of the hemorrhage? According to Simpson it comes from the maternal vessels, according to Depaul and others from the uterine sinuses. According to Duncan there are four sources: 1. A gush of blood comes from the blood-sinuses of the maternal portion of the placenta, at the moment of separation. 2. It comes from the placental surface itself. 3. From the circular sinus which is at the border of the placenta. 4. From the open uterine sinuses. Mackenzie and Snow Beck affirm that the gaping arteries at the point of separation form another source of the hemorrhage. Coagulation, local and general anæmia, uterine contraction, separation of the placenta, etc., favor arrest of bleeding.

3. *Hemorrhage after Delivery.*

Hemorrhage from placenta prævia is very grave if it occurs after delivery; it is due largely to uterine inertia, as well as to the extremely vascular condition of the inferior segment.

Diagnosis.—This is without difficulty, if the previous history of the case is studied with special reference to the occurrence of bleeding during pregnancy without known cause. After the placenta has been expelled, it is easy to recognize the site of its insertion. When the placenta is inserted at the fundus, the membranes rupture at the most dependent point, that is to say, at the part in contact with the os internum; hence the sac is at the opposite extremity from the placenta. But when the latter is inserted in the lower segment the membranes can with difficulty rupture spontaneously, so that the attendant must rupture them with the hand or an instrument. When the insertion is marginal, the membranes rupture at the most dependent part, which is near the edge of the placenta.

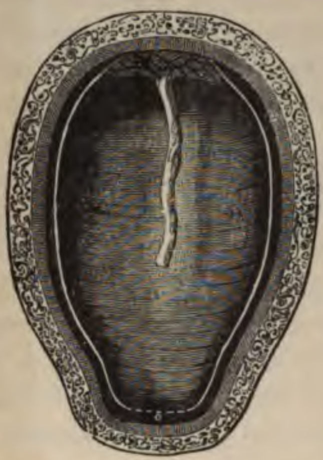


FIG. 150.

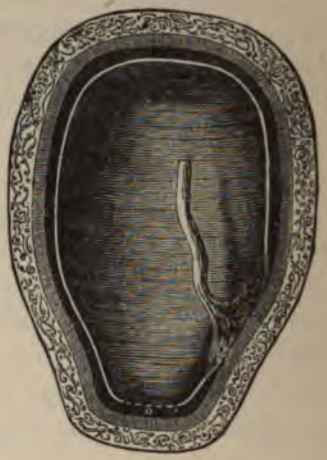


FIG. 151.

FIG. 150.—RUPTURE OF THE MEMBRANES IN CASE OF NORMAL INSERTION OF THE PLACENTA.
FIG. 151.—RUPTURE OF THE MEMBRANES IN CASE OF ABNORMAL INSERTION OF THE PLACENTA.

Prognosis.—Placenta prævia is one of the gravest complications of pregnancy and labor. We would first call attention to the frequency of labor before term:

3 months,	1
4 “	2
5 “	10
6 “	21
7 “	113
8 “	234
9 “	144
End of pregnancy,	331

As to the variety of the placental insertion:

5 months,	2 incomplete	5 complete.
6 "	7 "	7 "
7 "	33 "	39 "
8 "	56 "	85 "
9 "	40 "	55 "
End of pregnancy,	153 "	113 "

As to the maternal mortality, it varies from 32 per cent. to 25 per cent.; and as to the fœtal mortality: Simpson of 106 children lost 73; Depaul of 63 lost 39; Müller of 853 lost 486. The mortality in general may be stated as 64.18 per cent. It varies considerably according to the month when labor sets in: thus at 7 months, 15 per cent., at 8, 29 per cent., at 9, 18 per cent., at term 35 per cent.

It varies with the mode of insertion of the placenta. In 739 cases the mortality was 57 in marginal and 109 in central implantation. If the contractions are regular and strong, the labor will be terminated sooner to the advantage of both mother and child. The prognosis for the mother becomes more favorable after the death of the child, as the hemorrhage diminishes. The placenta may be adherent, as in 80 cases out of 341, collected by Müller and others.

The maternal mortality in cases of spontaneous delivery is from 11 to 14 per cent., in artificial about 21.8 per cent. The fœtal mortality in the former case is 32 per cent., in natural delivery preceded by a preliminary operation, 54.2, and in artificial delivery, 57.3 per cent. The following results were obtained by inducing premature labor:

Hecker,	out of 40 women, ...	lost only 3
Hoffmann,	" 33 "	" 2
Spiegelberg,	" 74 "	" 4

Treatment.—Different methods have been followed by different authorities, according to the diverse theories which have been adopted. One thing is to be remarked, most of them have made little account of the child's life as compared with that of the mother. We shall see if it is not possible to consult the safety of both.

The prominent symptom is hemorrhage, and this must be treated actively, and not with mere palliative means. There is one remedy which, although it may be of benefit in hemorrhages occurring during the first six months of pregnancy, is certainly contra-indicated during the last three; we refer to venesection. It would only hasten the fatal issue if employed when a patient is already exhausted from loss of blood, and should be condemned in cases of placenta prævia. Opium tends to diminish the contractions, and may therefore do more harm than good; cold and astringent injections are not sufficiently powerful; we are accordingly limited to a few other agents. These are ergot, forced delivery, the tampon, rupture of the membranes, and separation of the placenta and extraction of the same before the child, according to the plan recommended by Simpson, Barnes, and other English writers.

Forced Delivery.—Accouchement Forcé.—This is the most ancient method, which has been practised by many authorities; Levret recommended it only in cases of central insertion. It is a deplorable procedure, and ought not to be employed except when all other means have failed. The old obstetricians used to introduce one or two fingers through the os, and then the entire hand, after which they turned and extracted the child. This operation, no matter how gently it may be performed, always results in contusions or tears of the cervix, sometimes with resulting gangrene. It is only possible to practise it after the cervix has become softened in consequence of the preceding hemorrhage; and besides, after the child has been turned and partially extracted, the cervix may grasp its neck so firmly, that it is impossible to extricate it. Now it is customary to obtain more room by making multiple incisions, preliminary dilatation having been effected by introducing two fingers through the os; but, although such incisions are usually harmless, they may sometimes extend beyond the inferior segment.

Rupture of the Membranes.—Puzos proposed this method, which still bears his name, although his claim to be its originator is not well founded. It consists in rupturing the membranes after the os has become moderately dilated, on the ground that this causes the pains to become stronger, and consequently checks the hemorrhage. One or two fingers are introduced into the os, and it is slowly dilated, pressure being suspended at intervals in order to allow the pains to recur. The membranes now protrude, and are freely ruptured. After some of the water has escaped, the inferior uterine segment can contract to greater advantage, so as to force the head downwards, and thus to compress the bleeding vessels. In this way both mother and child are saved, whereas they would inevitably have been lost in a spontaneous delivery, and would have been seriously imperiled by forced delivery. This method is not applicable to all cases. When the os is completely covered by the placenta, some advise perforating the latter in order to rupture the membranes. Gendrin prefers to separate the placenta at one edge, until the membrane is reached, and then to puncture the latter. Dubois only resorts to rupture in cases of marginal implantation. We follow Gendrin at the Maternité wherever it is possible. Of course rupture of the membranes is contra-indicated in cases of faulty presentation; it does not always hasten labor, and we have then sought to aid it by employing other ecbolic means.

Ergot.—Ergot occupies the front rank among these; but it is a remedy which is dangerous for the child, if not for the mother, and should therefore be used with caution. Labor ought to be clearly advanced, and the head well engaged. In moderate doses it may be of great service in hastening dilatation by increasing the contractions, and thus facilitating delivery, as well as in preventing post-partum hemorrhage. It must never be given in cases of *contracted pelvis*, where there are *organic lesions of the uterus*, or where the *presentation is faulty*, because under these circumstances we should be liable to produce results just the opposite of those at which we aimed, and, unfortunately there are only too many cases on record in which the unwise administration of ergot has produced rupture of the uterus.

The Tampon.—This is the best means of controlling hemorrhage in placenta prævia, but, in order to obtain actual results with it, it is necessary to introduce it properly, and under proper conditions. Leroux (of Dijon) should be credited with popularizing this agent, which is now generally employed, except by Barnes, who has a special method of his own. The vaginal tampon is simply a dam, opposed to the stream of blood, which favors coagulation of that fluid, and obstruction of the openings of the vessels, and thus puts an end to the hemorrhage. Cotton and charpie make the best tampons, but any substance (tow, sponge) may be used in an emergency. As artificial tampons may be mentioned, Gariel's, Braun's colpeurynter, and Chassagny's balloon; but these act less perfectly than the classical tampon. This consists of pledgets of cotton, either united or single, the latter being preferable. The tampon must be sufficiently firm and resistant to close the vagina hermetically. The quantity of cotton necessary is enormous, a pound or a pound and a half not being too much in some cases, especially in multiparæ. This amount is divided into three portions, one consisting of balls the size of small nuts (20 or 30), with a long thread attached to each; the other of pledgets of the same size, without threads, the third portion not being thus separated; 5 or 6 compresses and a T-bandage complete the apparatus. To introduce a tampon, place the woman on a couch, either transversely, or in the ordinary position, and give a vaginal injection of warm water, in order to wash away blood and clots; then empty the bladder, and the rectum also, if there is time. Some are accustomed to moisten the first tampon in a weak solution of perchloride of iron. I see no especial advantage in this, and I much prefer to anoint them with oil or cerate, so that they will glide in more easily. We do not aim at producing an astringent effect, but at making pure mechanical pressure. Having greased the pledgets, introduce them one by one, beginning with those to which threads are attached, and finally tie the latter together; press them in firmly, so that no space remains. Some insert the first tampon into the cervix, and then fill the fornix, others pack the *culs-de-sac* first, and then cover the cervix. After the tampons with threads have been introduced, the vagina is filled with the ordinary ones, which are packed into all the interstices, until the cavity is about three-fourths full. On arriving at the vulva, fill it out with dry cotton, apply three or four compresses over this, and secure the whole with a T-bandage. If the tampon has been properly applied, it will remain nearly dry, that is, the outer layer will not be moistened. If a reddish fluid soaks through, do not hesitate to remove the tampon, and to insert another. The rule is to proceed slowly, pressing the tampons firmly against the cervix and the posterior part of the vagina; the whole success of the operation depends on this. The patient's life only depends upon the rapidity and dexterity with which we can practise it. After tamponing the patient, we keep her perfectly quiet, on liquid diet, administering small doses of ergot, if indicated. In order to be effective, the tampon should remain *in situ* from twelve to twenty-four hours. Now, Barnes advises that it be removed in an hour, but it is impossible to obtain good results in this way. Practitioners are always in too much of a hurry to remove it, and they thus lose all the advantage of it. In Germany the *modus operandi* is a little different. A speculum is introduced so as to expose the os, and through the instrument a cambric handkerchief is inserted, the interior of which is filled with pledgets of cotton, the speculum being withdrawn as the vagina is distended. The entire tampon may be withdrawn by drawing out one corner of the handkerchief. The opponents of the tampon claim that it substitutes internal for external hemorrhage, brings on premature labor, and causes the patient pain, as well as disturbance of the bladder, etc. To the first objection it may be answered that it is impossible that there should be much internal hemorrhage, even granting that it does occur, because the uterus is still occupied, and the membranes are intact; moreover the tendency is to coagulation and arrest of the hemorrhage. After the membranes have ruptured, there are usually uterine contractions, which tend to diminish the size of the uterine cavity; moreover the fœtus is still present to diminish the space in which blood might accumulate. In reply to the objection that the tampon tends to hasten labor, it should be stated that the hemorrhage usually appears after the seventh month (or thirtieth week), when the child is viable; but many observations prove that the tampon has, in some instances, remained *in situ* even as long as forty-eight hours without inducing labor, and even when this does occur, can we hesitate between this inconvenience and the danger which inevitably threatens mother and child if the hemorrhage is allowed to continue; and should we for this reason deprive ourselves of a resource which almost certainly saves the mother, and does not deprive the child of every chance of surviving? It is very easy to remove a few tampons in order to catheterize a patient, and the rectum should be emptied before the cotton is introduced. How long shall we leave the tampon in place? Pajot and Depaul would not disturb it, unless there is fresh bleeding, for twenty-four or thirty-six hours; but while the latter believes in terminating the labor as soon as possible, Pajot would leave entirely to Nature the successive expulsion of the child and of the tampon. Depaul removes the tampon after the expiration of the time mentioned, and does not insert another unless the hemorrhage continues, but the patient is carefully watched, so that she can be at once tamponed in case of need. This treatment is usually sufficient if labor has not begun. If it has commenced, but dilatation is slight, a fresh tampon is introduced, and a small dose of ergot is administered; the pains then increase, the cervix dilates, and in from eight to twelve hours the cotton is removed, and the membranes are punctured. As a rule, labor proceeds without much hemorrhage, and as soon as the os is sufficiently dilated, the child is extracted with the forceps, or after version. If, on the contrary, profuse bleeding recurs, or the woman has been exhausted by the previous loss of blood, the tampon is not disturbed until dilatation is complete. The placenta is extracted immediately after the birth of the child.

Bailly proposes to tampon, and instead of withdrawing the cotton when dilatation is supposed to be complete, not only to leave it *in situ,* but to prevent its expulsion by supporting it with the hand during the pains, and pushing back in the interval; then, when a portion of the tampon has been expelled by the natural efforts, fifteen or thirty grains of ergot are administered, to aid the uterine contractions, and to insure its contraction after the expulsion of the child. If there is no bleeding, the after-birth is not extracted until after an interval. If fresh hemorrhage occurs, it is detached artificially. A fatal objection to this method lies in the fact that the fœtal mortality is much greater when we wait for the natural termination of labor than it is when we empty the uterus at the proper moment. The following objections may be made to this method: 1. It is only applicable to cases of normal presentation, whereas faulty presentations are especially common in placenta prævia. 2. In some instances, where the tampon is applied after rupture of the membranes, a serious internal hemorrhage occurs. 3. In leaving the tampon to be expelled by the uterine contractions, we assume that the latter are very powerful, whereas they are habitually feeble in these cases. We are usually called to the patient after she has been already exhausted by loss of blood, and after the membranes are ruptured and the uterus is contracting feebly; the indication is to tampon at once, to restore the patient's strength with stimulants and broths, and, after the expiration of twenty-four or thirty-six hours, to interfere and terminate the labor.

Finally, there is another objection to Bailly's method. He supposes that the os will be hermetically sealed as long as the tampon remains in the vagina; but, as the cervix dilates and retracts, it becomes removed from the tampon, so that a considerable space is formed between the two, in which a large amount of blood may accumulate. It is only exceptionally that we can employ this method, in cases where we are called at the beginning of labor, and find the membranes intact, the presentation normal, the contractions sufficiently powerful, and the patient still in good condition. We may lose the child then, but we shall certainly save the mother. If, however, the conditions are the reverse, the woman being exhausted and the labor retarded, we should prefer Depaul's plan—tampon, wait until there is sufficient dilatation, rupture the membranes, tampon again if the hemorrhage recurs, and as soon as labor can be terminated without violence, terminate it. We shall then probably save the mother, and, if the child has still any chance of living, we shall have done all that we can to preserve it.

Granting that the termination of the labor is indicated, and that this is possible, how should we act? Two cases are presented, the insertion may be marginal or central. In the first instance, do not hesitate; the hand or instruments must be introduced where the path is open, that is, where the os is not covered by placenta. If the membranes are ruptured, enter by the natural passage, and search for a foot or apply the forceps. If the membranes are intact, rupture them, introduce the hand or instruments, and deliver if the persistence of the hemorrhage indicates the necessity of so doing. But, if the bleeding is slight, and the head presents so as to form an internal tampon, and if the contractions are sufficiently powerful—in short, if active interference is not called for—leave the labor to itself, and you will see it terminate rapidly and spontaneously.

In central placenta prævia the method of procedure should be somewhat different. Whether the membranes are ruptured or not, two courses are open to us: perforate the placenta, seek the feet of the child, and draw it through the opening thus made in the placenta, or, as Gendrin advises, detach the placenta completely at one side, enter by this artificial opening, seize a foot and extract. Both of these manœuvres are extremely dangerous for the child, whose vascular connections with the mother are cut off, but the second seems to me to be much preferable to the first, because it is easier of execution, and causes less disturbance of the utero-placental circulation. We thus give the child some chance of surviving, and do not imperil the mother.

The choice of the hand or instruments, after the separation of the placenta has been effected, is governed by all the conditions (presentation, prolapse of a part, etc.) which regulate our conduct whenever the question of artificial delivery presents itself. Only, we must not forget that, in cases of abnormal insertion, every moment is precious both for the child and for the mother, and we must resort to the procedure which seems to afford us the means of terminating the labor most promptly.

[The treatment of placenta prævia advocated by Charpentier, is, we believe, faulty in many respects, and, like almost all methods, takes scarcely any account of the life of the child. The tampon is favored to an extent not warranted by contemporaneous opinion, and, we would strongly insist, ergot, in however small a dose, is distinctly contra-indicated. The practice which we should favor may be outlined as follows: As soon as the diagnosis of placenta prævia has been reached, and this will ordinarily be the case on the occurrence of the first profuse hemorrhage, temporizing is out of the question, for the simple reason that the next hemorrhage may occur at any time, and might prove fatal before any of the indicated measures could be resorted to. In our opinion it is playing with two lives, certainly the maternal, to postpone active measures. As we have seen, the first hemorrhage from placenta prævia ordinarily occurs after or at the seventh month, when the child is viable, and there can, therefore, be no reason for delay in the induction of premature labor. In case the seventh month had not been attained, we would only counsel delay in cases where the patient could be under the immediate, constant care of the medical attendant. Induce labor, then, on the occurrence of the first hemorrhage, would be our advice.

One of the most efficient means of exciting uterine contractions is thorough tamponade of the vagina. In case of placenta prævia, before the membranes have ruptured and before dilatation is sufficiently advanced for the purpose of the active method to which we will shortly refer, the tampon may be used without fear of concealed hemorrhage. It must, however, be rightly applied, and the sole way of accomplishing this efficiently is through Sims' speculum, in the lateral position. Where this speculum is not at hand, the woman should still be made to assume the lateral position, and two or more fingers of the hand may be used as a perineal retractor. The tampons, it is immaterial of what substance, provided it be clean, should be so inserted as to compress the lower uterine segment and the cervix, that is to say, they are placed first firmly in the posterior fornix, and then in the anterior, and finally a layer over all. They should not remain in place longer than twenty-four hours, and ordinarily less than this time is sufficient to enable one to resort to the active step which constitutes the modern treatment of placenta prævia, and the best, as well, for the reason that by means of it, not only are more mothers saved, but also no more children lost.

In the "American Journal of Obstetrics," for December, 1884, will be found the most valuable contribution to the subject of the treatment of placenta prævia, which has ever been written. It was contributed by Lomer of Berlin, who, in a judicial manner, weighs the evidence in favor of the various methods of treatment heretofore advocated, and then proves that through resort to bi-manual version (the method of Braxton-Hicks), as soon as the cervix is sufficiently dilated to permit the procedure, the maternal mortality is reduced to figures never even approximated by any other procedure, not excepting the method so ably advocated by the elder Barnes.

The method consists, briefly, in performing bi-manual version as soon as possible, pulling down a leg and tamponing with it and the breech of the child, the ruptured placental vessels. "*Do not extract the child then*; let it come by itself, or at least only assist its natural expulsion by gentle and rare tractions. Do away with the plug (tampon) as much as possible; it is a dangerous thing, for it favors infection, and valuable time is lost in its application. Turn as soon as you can pass one or two fingers through the cervix. If the placenta is in your way, try to rupture the membranes at its margin; but if this is not feasible, do not lose time; perforate the placenta with your finger, get hold of a leg as soon as possible and pull it down." By this method it may seem, at first sight, as though, after all, but little regard was shown for the infant's life, but, as the statistics we annex show, the results for the child are certainly no worse than by other methods, and yet incomparably better for the mother.

Up to the time of writing, Lomer was able to present the following results from this method:

Hoffmeier's cases, ...	37	with	1	death
Behm's "	40	"	0	deaths
Lomer's "	101	"	7	"

that is, a maternal mortality of 4.5 per cent., while we have seen that the lowest mortality by any other method of treatment was 25 per cent., as given by Trask, 23 per cent. as given by Müller, and 22.5 per cent., as given by King (Indiana), taking cases collectively, and when taken singly, by operators, Spiegelberg 16 per cent., Hecker 10 per cent., Barnes 8.5 per cent., Hecker and Murphy (30 cases) 0 per cent. These latter are selected results, and, to apply the same process to Hoffmeier's, Behm's and Lomer's personal cases, we have a series of 93 cases with 1 death.

As for the children, the mortality rate in the cases recorded by Lomer was 60 per cent., practically the same as by other methods, but in reference to this question, Lomer draws the following conclusions, which are eminently just: 1. The average mortality of children born spontaneously after turning, is not superior to that of children extracted immediately after turning. The danger the child runs by not extracting it has therefore been overrated. 2. In case of placenta prævia, a child's life is of so little practical value compared with that of the mother, that, should it be endangered by leaving it to be born by the natural powers, we are entitled to sacrifice it in cases in which we would endanger the mother by quick extraction. The only objection that could be made to the method is, therefore, of no serious importance.

For further information in regard to the method advocated, and the detailed analysis of the results obtained, we are forced to refer to the monograph itself. It will repay careful study, and will bear critical judgment.—Ed.]

In regard to the results obtained by various methods the following statistics are given by Weil: In 32 cases 15 mothers were saved, 6 out of 8 in which the tampon alone was used, and 9 out of 24 in which the tampon was employed with subsequent resort to rupture of the membranes, forceps, or version, or a combination of the same. Among 11 cases reported by Bailly, 2 out of 5 were saved by version, and 5 out of 6 by the use of the tampon alone. But the latter writer fails to state the conditions under which he acted. The results in the *Clinique de la Faculté*, were as follows: Among 16,613 cases of delivery which took place during the years 1852-1873 (the record for 1853 being defective) there were 65 of placenta prævia, 43 mothers and 23 children being saved; 53 women were multiparæ, and 12 primiparæ; in 21 cases the insertion was central, in 44 marginal. 33 patients were delivered spontaneously, with 8 maternal and 19 fœtal deaths, 22 by version, with 9 maternal, and 16 fœtal deaths, and 9 by the forceps, 4 mothers and 6 children succumbing. The conclusion to be drawn from these statistics is opposed to that of Bailly, because, if spontaneous delivery was followed by such good results when the tampon was not allowed to remain indefinitely, it shows that his success was due not to the fact that he left it until expelled, but because delivery was spontaneous. In short, interference of any kind is undesirable, and we ought then to abstain from it. Unfortunately, this is not always possible, and we are then compelled to resort to the only means that are left to us, that is to say, to delivery by the forceps or by version, and this is the plan followed at the *Clinique.*

Müller gives the following statistics in connection with version in placenta prævia:

Authors.	Cases of Version.	Deaths.
Mauriceau,	14	1
Portal,	12	1
Giffard,	18	5
Smellie,	8	3
Rigby,	35	9
Clarke and Collins,	7	4
Busch,	5	2
Schweighauser,	46	11
Madame Lachapelle,	13	6
S. Ramsbotham,	86	40
F. Ramsbotham,	96	37
Lever,	30	7
Lee,	28	10
Wilson,	22	8
Harding,	3	2
Jackson,	1	1
Thompson,	1	1
Roberts,	2	2
Storer,	1	1
Hanks,	1	1
R. Thomas,	2	2
Trask,	429	104
	860	258

The mortality is 30 per cent. Comparing these results with those of version in cases of normal implantation, as given by Sickel, out of 3476 versions there were 291 deaths, or 8.3 per cent. Of 416 children delivered by version in case of placenta prævia, 250 died (60 per cent.); in 10,910 versions with normal implantation, 5653 died (51.8 per cent.)

Müller reports 92 cases of *accouchement forcé* followed by version, with a maternal mortality of 47.8 per cent., and a fœtal of 62.7 per cent.; in 34 cases, in which the os was first dilated by the tampon or colpeurynter, 35.2 per cent. of the mothers and 50 per cent. of the children perished.

The same writer states that in 105 cases in which the tampon was applied according to the German method, the hemorrhage was arrested in only 58; in 128 cases in which the influence of the tampon on uterine contractions was studied, in 55 the pains became vigorous in from 1 to 12 hours. Out of 161 women with placenta prævia, in whom contractions were caused by the introduction of the tampon, 126 mothers and 64 children were saved, 6 of the latter dying soon after delivery.

Chassagny uses his intra-uterine dilator to dilate the cervix and hasten delivery, but its hæmostatic action is limited. Legroux ruptures the membranes, and then has the woman supported in a standing posture, with the view of causing the descent of the head, so that it may act as a tampon.

Separation of the Placenta.—This method, proposed by Radford, and ardently championed by Simpson, has been generally attacked in France and Germany, while in England it is especially advocated by Barnes. Having collected some 40 cases in which the placenta was expelled before the child, the hemorrhage being arrested, and noting that this arrest was due to compression of the vessels by the head of the child, and also that the child was always born dead under these circumstances, he laid down the following nine propositions:

1. Neither delivery nor detachment of the placenta should be attempted until the os is sufficiently dilated to allow the introduction of the hand. 2. If the fœtus is certainly dead, we should detach the placenta completely, rupture the membranes, and leave the case to nature. 3. If the pelvis is narrow, extract the placenta, then perforate and extract the child with the crochet. 4. If the os admits the hand, detach the placenta, if the membranes are ruptured and the pains strong. 5. If there is an exhaustive hemorrhage in central placenta prævia, perforate the placenta at its centre, and use galvanism. 6. In cases of partial insertion rupture the membranes, and use galvanism if there is hemorrhage. 7. Remove the placenta if all other means fail to check the bleeding; also 8. When artificial delivery is dangerous or impossible. 9. When the death of the fœtus renders the safety of the mother the only consideration, extract the fœtus immediately.

Now, Simpson's theory is false at the outset. The hemorrhage, as Lee and Ashwell have proved, comes from the uterus, and not from the placenta; moreover, Simpson would detach the placenta before the os is sufficiently dilated to allow version. Simpson reports 141 cases of extraction of the placenta before the birth of the child; in 47 cases there was an interval varying from ten hours to ten minutes between the expulsion of the placenta and the birth of the child, 44 mothers and only one child being saved; in 24, in which the child was born within ten minutes after the extraction of the placenta, 21 mothers and 11 children were saved. In 30 cases the placenta came away immediately before the child, or both were expelled together, 21 mothers and 11 children surviving; in 40 the exact time that elapsed between the separation of the placenta and the birth of the child was not known, but 36 mothers and 7 children were saved. To summarize, 129 mothers and 31 children out of 141 were saved. Other writers have not had the same success with Simpson's method, Walter having lost 10 mothers and 30 children in 33 cases, Hecker 27.5 per cent., and Trask, 13 mothers and 41 children in 61 cases.

Finally Barnes proposes the following: If the pregnancy has only reached the fifth or sixth month, the os is not dilated, there are no pains, and the hemorrhage is moderate, we can wait; if there is considerable bleeding and the contractions are fair, no matter what may be the age of the pregnancy, we ought to act at once and hasten the labor by: 1. Puncturing the membrane. 2. Applying a tailed-bandage to the abdomen, so as to excite contraction. 3. Introducing a tampon. 4. If the os is sufficiently dilated, and if there is hemorrhage, separate all that part of the placenta which is attached to the cervical zone. 5. If the os is not dilated, dilate by means of the dilators, and then detach the placenta from the cervical zone, by introducing the hand into the vagina, and sweeping two fingers around the os, so as to detach the placenta as high as they can reach. After dilating, bi-polar version is practised.

By the premature induction of labor, Thomas saved 10 out of 11 women and 6 children. However satisfactory these results may be, they are not, in our opinion, sufficiently numerous to induce us to abandon the tampon.

Treatment after Delivery.—We should not forget that hemorrhage may recur after delivery, from uterine inertia, as the inferior segment does not always contract sufficiently to obliterate the utero-placental vessels.

Ergot, the introduction of the hand, or of ice, into the uterine cavity, douches on the abdomen, electricity, massage of the uterus, intra-uterine injections, compression of the aorta, compression of the abdomen by an india-rubber bandage, and tamponing, have all been recommended. Perchloride of iron applied to the cervical cavity and inferior uterine segment, will cause contraction and arrest the hemorrhage, after which the patient should be stimulated with hypodermic injections of ether, brandy and ergotin. [We object strongly to the sub-sulphate of iron, for reasons given later.—Ed.]

3. *Internal Hemorrhage.*

Hitherto we have been studying external uterine hemorrhage, but there is another form in which the blood is effused into the interior of the genital canal, and does not appear externally. During the early months of pregnancy, these extravasations take place in the midst of the decidua or placenta, constituting what was formerly called "placental apoplexy," but is now known as hæmatoma of the placenta or decidua. This leads to abortion after the lapse of a certain interval.

We shall, with Jacquemier, regard internal hemorrhage as one in which the blood is retained, wholly or partially, within the uterus, together with the product of conception; but this will include only hemorrhage that occurs before the beginning of labor. Hemorrhage from placenta prævia is usually external, but it may become internal, if a tampon is introduced after rupture of the membranes, but it is only hemorrhage which is internal from the first that really deserves this name. During the first months after conception, the blood accumulates between the uterus and the placenta, stripping off the latter more or less extensively, penetrating between its cotyledons, and infiltrating the tissue, being either circumscribed in it, or extending beyond it, even making its way into the ovum in rare instances. This bleeding is of little consequence, and does not endanger the mother still there are cases on record in which the hemorrhage has been so profuse that the patient succumbed in a short time.

Internal hemorrhage occurs not infrequently before labor, when it gives rise to characteristic symptoms, such as lumbar pains, uterine colic, anæmia, and an increase in the size of the uterus, which is too sudden to be attributable to anything except intra-uterine hemorrhage. In rupture of the uterus, or the sac of an extra-uterine pregnancy, the extravasation takes place into the abdominal cavity, and the symptoms are quite different. Internal hemorrhage is called by some writers "accidental," in distinction from that which attends placenta prævia, which they term "unavoidable." When due to separation of the placenta, the hemorrhage may be either internal, external, or mixed, it resulting, according to Jacquemier from: 1. The uterine contractions, which disturb and sever the connections between the placenta and the uterus. 2. Excessive hyperæmia of the uterus and placenta in consequence of violent emotions. 3. Direct violence. 4. Acute diseases of a grave character, as small-pox, scarlet, or typhoid fever, acute yellow atrophy of the liver, etc. The hemorrhage may occur either before, or during labor, and may manifest itself by symptoms of external or internal bleeding. As to hemorrhage during labor, it may be said that women frequently lose a little blood at the beginning of labor, and also after the cervix is completely dilated, but this possesses no significance; moreover, in long labors, or when the perineum is quite resistant, blood may escape externally without causing alarm. In normal labor the placenta does not begin to separate until after the expulsion of the child, but sometimes it becomes detached prematurely, and thus gives rise to slight hemorrhage. This rarely assumes serious proportions, but we should observe carefully the condition of the woman and the fœtal heart-beats, and interfere if necessary, employing the forceps or extraction, though this is rarely required.

Slight oozing is observed in some cases in which the cord is abnormally short; this is also due to premature separation of the placenta.

4. *Hemorrhage from the Vessels of the Cord.*

This is due to rupture of the cord itself, or of its vessels, caused by: 1. Disease of the vessels, or a varicose condition of the umbilical vein. 2. Abnormal distribution of the umbilical vessels in cases of velamentous insertion. 3. Shortness of the cord. The indications are to terminate the labor as soon as the source of the hemorrhage is discovered.

XIV. *The Artificial Removal of the Placenta, and the Hemorrhages of the Third Stage of Labor.*

The factors which call for interference with the natural completion of the third stage of labor are: Inertia of the uterus, excessive size of the placenta, rupture of the umbilical cord, spasmodic contraction of the uterus, adhesion of the placenta, hemorrhage, inversion of the uterus, rupture of the uterus and eclampsia. The last two we have already studied.

Inertia of the Uterus.—We have seen that the advent of the third stage of labor was ushered in by return of the uterine contractions, hardening of the uterus, slight bloody discharge from the vagina, and the appearance of the placenta within the cervical canal. In case these contractions do not return, or not sensibly, we are brought face to face with inertia of the uterus, and this organ instead of being hard and contracted, is felt to be soft, and pains are absent. In case the inertia is due to feebleness or to absence of uterine contractions, either the placenta has separated or not. In the first instance, there is no hemorrhage, and we must carefully abstain from active intervention. Traction on the cord would only result in its rupture, or else in prolapse or inversion of the uterus. We should await the return of uterine contractions, and endeavor to promote these by friction of the fundus. If at the end of a half hour, contractility do not return, then we should resort to Credé's method, to expression. This is the only instance, in our opinion, where it is applicable. We much prefer it to titillation of the cervix, to the application of cold over the abdomen, as recommended by Cazeaux. Usually, under the influence of stimulating drinks and friction over the fundus, contractility returns in the course of a half an hour. In the second instance, there is hemorrhage, and then we must not wait, but, as we will shortly see, remove the placenta as quickly as possible.

[Charpentier is eminently correct in the practice here advocated, but he is inconsistent. If Credé's method is of value here it is fully as valuable in the natural third stage of labor, and yet he there rejects it. There are instances where even Credé's method fails to overcome the inertia, and then, in the absence of special indication calling for the manual removal of the placenta, we cannot too strongly recommend the faradic current. A small pocket battery is amply sufficient, and we believe that it should find a place in every obstetric bag. One prime point should be insisted upon here, and this is never to administer ergot to overcome the inertia until the placenta has been delivered. The reason is obvious. —Ed.]

Excessive Size of the Placenta.—In such cases the uterus is found enlarged, soft, and the symptoms of internal hemorrhage are present. If frictions over the fundus and tractions on the cord do not avail for delivery, the hand must be inserted into the uterus and the placenta removed.

[Here, as in every other instance, we are absolutely opposed to any traction on the cord. It is never necessary, and may result in alarming complications and injury to the mother.—Ed.]

Weakness and Rupture of the Cord.—Weakness of the cord may depend on the fact that the labor is premature, or because it is not inserted at the centre of the placenta, or else that the vessels divide within the membranes. Even moderate traction, in these cases, may cause rupture, but this, we are obliged to add, is usually due to the fact that traction is exerted before the placenta has entirely separated. In case of rupture, either there is no hemorrhage, when we should abstain from interference, or else there is, and then we must at once insert the hand into the uterus and deliver, when the uterus will contract and the hemorrhage cease. In every case where there exists what we may call simple retention of the placenta, intervention is easy, and it is here, as we have stated, that we may resort to the so-called Credé's method of expression. We should never, however, forget that the third stage of labor is a natural, physiological one, and that in the vast majority of cases it may be left entirely to nature, and that the complications of this period are often due to untimely interference. For our part we apply pressure over the uterus only when the third stage drags, or else when we fear uterine hemorrhage or inertia.

Adhesions of the Placenta.—We have already referred briefly to the diseases of the placenta, but we must dwell on them here further, because, as Guéniot says: "Very intimate union between the uterus and the placenta is one of the most formidable complications of the third stage, especially when this adhesion is to the extent of fusion of the placental and the uterine tissue." These adhesions may be accompanied or not by hemorrhage, and by spasmodic contraction of the uterus. What is the cause? While the majority of authors agree with Hegar in the belief that adhesions are usually the result of inflammation of the uterus, of endometritis, of placentitis, of fibrous degeneration of the elements uniting the organ to the uterus, Guéniot, instead of seeing in these instances a lesion the result of pathological alteration, detects the absence of a physiological factor, which engenders the anomaly. "When," he says, "we find, after labor at term, degeneration of the placenta, instead of searching for a pathological cause, why not ask ourselves why these adhesions, which are normal at four months, have not progressively weakened during the second half of pregnancy? why, in a word, the physiological labor, which leads to disunion, has not progressed?" This query is purely speculative. The researches of Hegar, of Schroeder, of Spiegelberg, point convincingly to pathological alterations, and Guéniot himself admits them in case of endometritis.

Adhesions of the placenta are recognized by the following signs: When, notwithstanding energetic contractions, the placenta is not found in the cervix at the end of ten to fifteen minutes, we should suspect adhesions. This suspicion becomes certainty if, making traction on the cord, we feel it grow tense during the traction and abruptly retract on cessation. At the same time, during the traction, the woman complains of acute pain in the uterus, pain which increases with the intensity of the traction. In such cases if we persist we see rupture of the cord, [and exceptionally, perhaps, but still possibly, inversion of the uterus.—Ed.] If the adhesion be complete there is, generally, no hemorrhage, or it is insignificant, and the uterus, under the palpating hand, is hard and resistant, or soft and compressible. If the adhesion be partial, the finger feels a portion of the placenta, at a greater or less height, and there occurs hemorrhage which may be profuse. In this case, as Guéniot says, "the uterus cannot regularly contract, and the sinuses, which correspond to the detached portion of the placenta, remain open and give exit to the blood."

The treatment consists in introducing the hand into the uterus, and removing the placenta. Intervention of this nature is subordinated to the hemorrhage. If it be not present, we may well wait one hour to one hour and a half; but if it exist, we must interfere at once. We must be careful not to administer ergot, which would only result in contraction of the uterus on the placenta, and closure of the internal os, when if the hand could be introduced it would be at imminent risk of rupture of the uterus.

Where the adhesions are slight, it is not a very difficult matter to peel the placenta off with the finger, but usually, unfortunately, the uterus rebels against the introduction of the hand, or the adhesions are very firm and resisting. In the last instance the placenta must be scraped off, and with the greatest care, in order to be sure of removing the entire portion of the placenta and membranes. (Fig. 152.) In case after extraction a portion is lacking, the hand must be re-introduced. If great difficulty is met with it is better to desist, rather than by persisting injure the uterus. To say nothing of absorption of the placenta, which, although admitted by Velpeau and others, seems to us very problematical, we believe that the retention of a cotyledon or shred of the membranes is less dangerous than repeated attempts at extraction. From the observations of Hegar and many others, it is proven that often these cotyledons remain in the uterus a certain time without alteration, and are spontaneously expelled without much hemorrhage and without odor. Guéniot saw a fresh placenta expelled at the end of two days; I have seen the same occur at the end of five days. Usually, however, this is what occurs: A portion of the cotyledon breaks up and passes away in the discharges. Another portion putrefies and alters. This is either expelled at the end of a few days, (in a personal case at the end of thirty-seven days,) or else it becomes converted into a so-called placental polyp. The woman has but little fever, and tonic treatment as well as vaginal injections soon restore her to health. This, however, is not the rule. Under the influence of degeneration of the remnant, the woman is seized with chills, fever, and other symptoms of putrid infection, and, if we do not interfere, her life is greatly endangered. As to treatment, authorities are not in accord. While in England, and especially in Germany, active intervention is recommended, such as

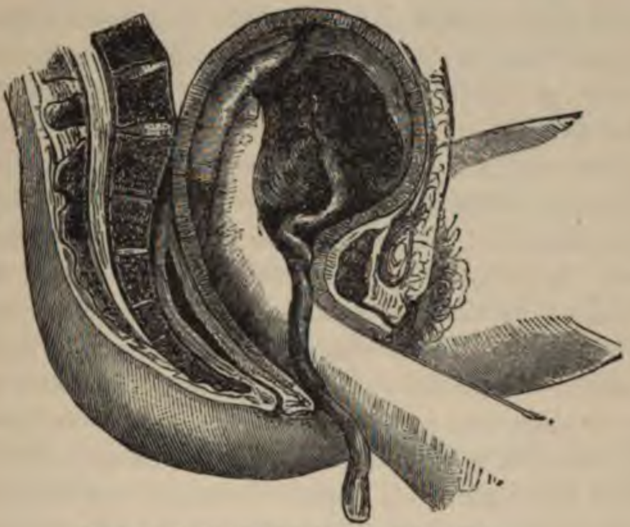


FIG. 152.—ARTIFICIAL REMOVAL OF THE PLACENTA.

dilatation of the cervix, curetting, etc., in France we are not so bold; and although Pajot uses the curette, and Depaul placental forceps, for our part, after having tried these means, we have rejected them, and we limit ourselves to intra-uterine injections twice, and vaginal eight to ten daily. In two cases we succeeded in saving septic women. To these measures, we add, of course, quinine, tonics, etc. The intra-uterine injections must be administered by the accoucheur, and with the double current catheter.

[Under the subject of miscarriage (Vol. II.), we have given our reasons in favor of an entirely different action from that which Charpentier advocates. It is unnecessary to repeat them here. We would simply lay stress on the following points, which are not emphasized as they should be in the text: Whenever the hand or instrument is introduced into the uterine cavity, give an intra-uterine injection of hot water (carbolized or sublimated, according to choice); and further, never fear injury to the uterus if manipulation is gentle, whether with the finger, dull curette, or placental forceps, half as much as the possible results from leaving a portion of the placenta or membranes in the uterus, to putrefy and poison the woman. Granting for a moment, even, that the chance of this occurring is slight, we would maintain that the accoucheur has no right to subject his patient to even this chance, when by prompt and timely action he can avert it without the least damage to her. We cannot repeat too often that the immediate removal of adherent placenta and membranes is, if done *lege artis*, not only not dangerous but salutary.—Ed.]

Spasmodic Contraction of the Uterus.—Even as in labor, the contractions may become exaggerated, lessened, perverted, so, during the third stage, they may present the same anomalies, which Stoltz considers spasmodic, and divides into spasm of the external os, of the internal os, of the body, partial or total. Of these four varieties, that of the external os and total of the body are rare. The latter usually is seen in case of presentation of the shoulder, where the physician or midwife has prematurely ruptured the membranes, in order to make the diagnosis, and where ergot has been administered. It is then that tetanus results, rendering version impossible, and calling for embryotomy.

Spasm of the internal os is relatively common. The uterus is divided into two cavities, a superior portion, hard, rigid, contracted; an inferior portion, soft and relaxed. The uterus assumes the form of an hour-glass, whence the term hour-glass contraction. In this condition, the placenta may: 1, be retained in the upper portion, the cord only passing through the os; or, 2, a small portion projects through the os; or, 3, one half of the placenta is above, and one half below the os; or, 4, the greater portion is below the internal os, and the remainder above.

The complication is the graver the more the placenta lies above the constriction. The real danger, however, is the association of adhesions and of hemorrhage. As long as there is no loss of blood, we may wait, the constriction yielding at the end of a few hours or less, and, if the placenta be not adherent, it is expelled spontaneously. If it be adherent, once the constriction yields, the hand should be introduced into the uterus and the placenta peeled off. If, however, at the end of this interval the constriction does not yield, the patient must be anæsthetized, and first one finger and then another passed gently through the os, and extraction proceeded with, all the more urgently, of course, in case there is hemorrhage. Stoltz recommends smearing the hand with extract of belladonna.

In partial spasm of the body, the placenta is encysted in a portion of the uterine wall. In this case the constriction is above the internal os, and the uterus is divided into three cavities, the one as far as the internal os, the second between this and the constriction, the third above the latter, where the placenta lies. The placenta may be encysted entirely or partially, or one or more cotyledons separately, the multilocular encystement of Guillemot.

On palpation the uterus is found irregularly contracted, the upper lobe being usually lateral, at a superior angle. Cases have been recorded by Riecke, d'Outrepont, Aschern, Payan and Scanzoni, where a portion of the placenta was inserted in the uterine end of the Fallopian tube.

As for the etiology, the majority of authors attribute the condition to partial and irregular contractions of the uterus. Bubendorf, however, claims that it is due to a paralysis at the placental site, the remainder of the uterus being well contracted.

As for the treatment, we must distinguish two categories:

1. The incarceration is simple, and not complicated by hemorrhage.
2. The incarceration is complicated by hemorrhage.

In both instances, the placenta may be free or adherent.

In the first instance, evidently, there is no call for haste, and yet we should not wait too long. Anti-spasmodics, opiate enemata, emollient injections, may be tried, but if at the end of a few hours matters do not change, we believe it of advantage to pass the fingers, gently, one after another, through the neck of the sac, wherein lies the placenta, and extract it, peeling it off if adherent. The woman, of course, should be chloroformed, not to relax spasm, for we believe that the uterus resists its action even after the heart, but to spare her pain, control her movements, and thus facilitate manipulation. (Fig. 153.)

If this method does not succeed, then we may resort to Dubroca's, which consists in breaking up the placenta by means of one finger passed through the constriction. After this manœuvre, the uterus should be washed out several times daily for a number of days.

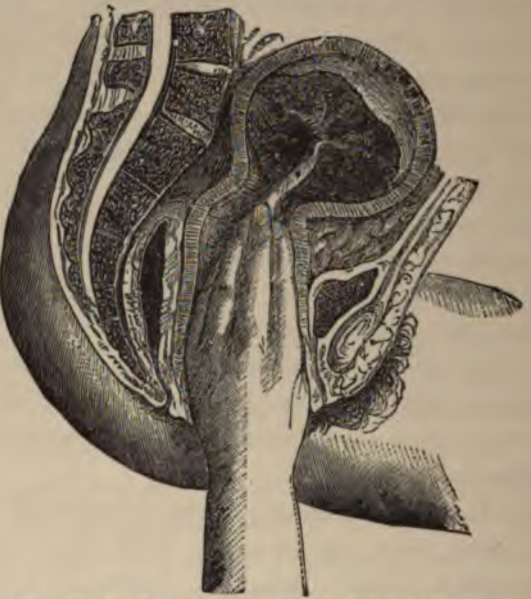


FIG. 153.—EXTRACTION OF THE INCARCERATED PLACENTA.

In case the incarceration is complicated by hemorrhage, we must act immediately; overcome the obstacle, and extract the placenta whether adherent or not. Usually the obstacle is readily overcome. Ergot should then be given to maintain contraction of the uterus.

In exceptional cases, where the placenta cannot be removed, and is not expelled spontaneously, we see develop septicæmia, with all its dangers, to which we will return at the end of this work.

Post-partum Hemorrhage.—Under this term are included the hemorrhages which occur after the birth of the child, during or after the expulsion of the placenta, and they are of the gravest possible import, for they may assume such magnitude that in a few moments the woman may be dead. The accoucheur needs all his courage and all his experience.

Practically, these hemorrhages may be divided into three varieties:

1. Hemorrhage accompanied by retention of the placenta.

2. Hemorrhage continuous or occurring after the expulsion of the placenta.

3. Hemorrhage occurring a few days after delivery, which constitutes secondary puerperal hemorrhage.

There is a prime cause for the two first varieties, and this is uterine inertia, which may be primitive or secondary.

The normal separation of the placenta is accompanied by loss of blood, except in those cases where the fœtus has been dead for some time. Contractions of the uterus, however, soon check this flow, and it is simply necessary to watch the woman in order to forestall relaxation and further hemorrhage. Occasionally this normal loss becomes abundant, owing to feebleness or irregularity in the uterine contractions, and then the placenta must be either partially or entirely separated, and the uterus does not retract.

Uterine inertia becomes, during the third stage of labor, a matter of extreme solicitude to the accoucheur. He should endeavor in every possible way to prevent it. When present, the uterine sinuses are wide open, the organ is capable of distension, a considerable amount of blood may accumulate in the cavity before appearing externally, and our intervention must not only be quick but certain.

Causes.—Inertia is met with: 1. In women excessively fat, in those in whom the uterus is greatly distended, (by hydramnios, twins, etc.), in case of prolonged labor—in a word, in women in whom the fibres of the uterus would seem to have suffered exaggerated distension, and thus to have lost their contractile property. It is more frequent in primiparæ, especially when they conceive late in life. 2. Where the onset of labor is sudden and its termination rapid, as though the muscular fibre had not had the time to develop its mode of action. 3. Where the course of labor is disturbed by emotion or fear, and where untimely traction is made on the cord, in order to hasten the third stage. 4. Finally, there are certain women who are apparently predisposed to hemorrhage of this nature in successive confinements.

Inertia may be local or partial, and thus the gravity of the accident and the difficulty of intervention vary.

Symptoms.—In general, there are none of a precursory nature. The hemorrhage appears suddenly. Certain authors attach importance, as a precursory sign, to the absence of the chill or chilly sensations which usually follow the completion of labor. But this is fallacious, seeing that in perfectly normal cases these sensations may be wanting. In a general way it may be said that there is danger of hemorrhage as long as the placenta and clots are within the uterus. The hemorrhage may be internal, external or mixed, usually the latter. In case of internal hemorrhage the uterus increases rapidly in size, and is soft to the palpating hand. The woman feels that she is losing blood, and often first notifies the accoucheur. Pallor, anxiety, tendency to syncope supervene; the pulse is frequent, small; convulsions, coma, set in, and death follows if the hemorrhage be not arrested. The fundus of the uterus may rise above the umbilicus, and is filled with clots which may be expressed.

The important point is to determine the cause of the hemorrhage, for on its localization depends the safety of the patient. Vaginal examination will give the most certain information. We must assure ourselves at the outset if the placenta has separated or not, if a portion only remains, for the presence of this foreign body means increase in the hemorrhage.

The indications for treatment consist in:

1. To empty the uterus of the contained placenta and blood.
2. To awaken contraction as speedily as possible.
3. To check the afflux of blood to the uterus.
4. To overcome the immediate and consecutive effects of the hemorrhage.

1. To fulfill the first indication, the woman must be placed flat on her back, the head low, and if there is retention of the placenta, it must be extracted at once. If the placenta has only partially separated and inertia is also present, common sense tells us to act against both at the same time, and fortunately the same measure suffices, and this is the introduction of the hand into the uterus. The cavity must be emptied of placenta and clots, but the hand must not be withdrawn too soon. The uterus must be compressed by the external hand. Where adhesions exist, it is sometimes impossible to remove all of the placenta. Indeed, in case of firm adhesions, the operation of removal is one of the most delicate and

difficult in the whole range of operative obstetrics. Never should force be used, lest the uterus itself be injured. Hüter proposes scratching away the placenta piecemeal till every trace has been removed, but the French teachers are less bold and radical, and when the adhesions are too resisting, they prefer to leave the expulsion of a portion to nature. Usually this remnant passes away in a few days in the lochia. Vaginal injections prevent the sojourn of the *débris* in the genital passage. We are not as yet in France sufficiently accustomed to the use of intra-uterine injections, and I believe that we are wrong in not resorting to them more frequently.

In case the placenta has completely separated, nothing is simpler, seeing that a few tractions on the cord will suffice to complete the third stage.

After the extraction of the placenta, the uterus must be watched with the greatest care, for often the organ relaxes and hemorrhage again sets in from what has been called secondary inertia.

In case the retention of the placenta is complicated by spasm of the uterus, and if there is hemorrhage, the manner of action is somewhat different. If the spasm is at the internal os, it yields usually at the end of a few hours, unless it has been artificially produced by large doses of ergot. In this instance, however, there is no hemorrhage, for the entire uterus partakes of the spasm. In case there is hemorrhage, we must proceed rapidly to overcome the spasm. Sometimes enemata of laudanum, twenty to twenty-five drops, belladonna to the cervix, cause relaxation, and allow of delivery of the placenta. If the hemorrhage is excessive, however, the hand must be passed boldly into the uterus. The same remark applies to cases where the placenta is encysted.

At the same time as the placenta is removed, we must evoke uterine contraction. Frictions over the uterus, irritation of the cervix, ergot, the introduction of the hand into the uterus, cold drinks, cold over the abdomen, [ice in the cavity of the uterus, the faradic current—Ed.], these are measures which suggest themselves. The English use opium, digitalis, turpentine, by the mouth, but these are means tardy in action. This does not hold true of intra-uterine injections. While in France we hardly dare use plain water, in England and Germany not only is cold water used, but also with vinegar or alcohol. Nowadays the belief is that the fear of penetration of fluid through the tubes into the abdominal cavity has been much exaggerated, especially since double catheters have been employed. In England and in Germany, obstetricians have even gone further, and injected into the uterine cavity styptic solutions, such as iron, where the hemorrhage cannot be controlled by other means.

Outrepont was the first to resort to this, and he was followed by Scanzoni and Kiwisch, who employed strong solution of the muriate of iron. Barnes, in England, lays down the following rules: He empties the uterus of clots and of placental *débris*, and then, by means of a Higginson syringe, he injects the iron solution directly into the cavity, with the precaution of first filling the syringe completely to avoid the injection of air. The fluid returns mixed with clots, and the perchloride of iron checks the hemorrhage by coagulating the blood directly in the mouths of the vessels, by corrugating the mucous coat of the uterus, by causing contraction, frequently, of the muscular fibres. "The perchloride of iron comes to our aid, and saves the women often when their condition is most desperate. The hemorrhage rarely returns if the injection be made as I have outlined, and in case it does, the process may be repeated. I grant that the perchloride may do harm, but we must remember that the hemorrhage, if it continue, may be fatal, and that the other means of checking it are not without danger. Our choice, then, must lie between an assured good, bought at a possible risk, and a certain ill which will probably result fatally. The following are the results which I have obtained by the use of the perchloride of iron: In many cases it has saved the patients when all other means were failures; in certain cases the hemorrhage has been instantly checked, and the women have had a phlemasia alba dolens. In a number of instances, where the women were *in extremis*, the hemorrhage has been checked, but not soon enough to be of avail. The remedy was used too late. The lesson taught us is that the perchloride must not be left to the last, when even it will do no good. It should be used early before complete collapse. I lose no time in resorting to the measure, such is my confidence in it." (Barnes.)

I have quoted thus at length from Barnes, because I wished to show how strongly he is in favor of the method. Personally I am not so enthusiastic, and in face of the possible risks, I would leave it as the last resource.

[We cannot fully coincide with the author in the treatment he advocates for post-partum hemorrhage. There is no emergency which calls for prompter action on the part of the accoucheur, and there is none which may be met more successfully, if met in time. In the face of profuse hemorrhage from an inert uterus, it is simply fooling with life to waste time in giving laudanum enemata, ergot, or applying cold to the abdomen. The safety of the woman depends on our obtaining immediate uterine contractions, and these may almost infallibly be obtained by the injection directly into the uterus of ice water, hot water (115° F.), or a styptic such as vinegar or iodine. Iron we do not like, with due deference to the opinion of Robert Barnes, for the reason that the clots which it forms are hard, and therefore irritating to the uterus, and readily decompose. Our own preference is for ice water and vinegar, equal parts, or hot water, injected directly into the uterine cavity. These agents are always in the house. No one need fear the passage of fluid through the Fallopian tubes, for the reason that, in the cases of which we are speaking, the cervical canal is widely open, and the water will unquestionably flow out by the widest orifice. Besides, no force need be used. As for the syringe, we prefer the fountain to the Davidson, which is similar to the Higginson, although the recently introduced bulb syringe, called the "Alpha," is an excellent one, seeing that the outflow is continuous, and not intermittent, as in the Davidson. The uterine tube should have the terminal end closed, and the openings should be bevelled downwards. It should be passed well to the fundus. The Chamberlain glass tube is as good as any which has been devised. While the injection is being administered, it stands to reason that other measures should be used, but they are all subordinate to the former. The patient's head is to be lowered, the uterus compressed through the abdominal wall, ergot is to be given subcutaneously, and faradization resorted to. This measure we have great faith in. Barnes, in his *Obstetric Medicine and Surgery*, thus expresses himself in regard to the interrupted current: "Of the remedies that present themselves, the most scientic is faradization. The experiments of Radford, Robert Barnes and Mackenzie, demonstrate, that under its power the uterus can be made to contract, even when it resists the influence of what may be called the diastaltic remedies." His only objection to it is that, except in hospital practice, the apparatus is not likely to be ready, or at hand. This objection should not hold, for in view of the great value of the faradic current in obstetrics, a battery should be carried in the obstetric bag, and the Gaiffe or similar pocket battery will answer perfectly, and not take up much space.

In case the measures outlined above succeed only when the patient is in collapse, the accoucheur should be prepared to resort to transfusion of blood direct, of milk, or a saline solution. A convenient formula for preparing the latter is: Chloride of sodium, 60 grains, chloride of potass, 6 grains, phosphate of soda, 3 grains, carbonate of soda, 20 grains, distilled water to 20 ounces, the whole heated to 90° F.

In case of hemorrhage of moderate severity, and not calling for such stringent measures, it is a good plan to place the patient on her side, introduce Sims' speculum, and tampon the cavity of the uterus by means of Sims' slide applicator (see Vol. II., under Miscarriage) the cotton being saturated with the compound tincture of iodine. The cotton plug, if not expelled spontaneously, should be removed at the end of twenty-four hours. —Ed.]

In addition to the measures mentioned, Chassagny has advocated the tampon by means of a special instrument which he has devised. It consists of two balloons united by a narrow isthmus and each may be inflated independently of the other. The one is for insertion into the cervix, and the other into the vagina. When distended by fluid, the uterine balloon compresses directly, according to Chassagny, the uterine sinuses, and thus checks hemorrhage. The instrument, however, is open to the objection, that being in the uterus it prevents retraction, and it can hence be only of transitory utility. This instrument Chassagny has latterly replaced by another, to which he gives the name *elytro-pterigoide*. In Figure 154 this instrument is seen in profile and in action. The bladders adapted to it are from the pig, and are prepared with sulphur, which adds to their lasting properties. It is of use, according to the inventor, 1, in case of placenta prævia, 2, to induce labor, 3, to increase pains and bring about the rapid termination of labor in case of eclampsia, 4, to dilate the uterus, 5, to check, instantly, ante-and post-partum hemorrhages.

The instrument consists of a speculum provided, internally, with two wings. As the bladder, inserted in the speculum, is distended, the wings separate and oppose the expulsion of the bladder. The inventor is still experimenting with it, and in his hands it has given good results.

There is a further means at our disposal in contending against post-partum hemorrhage, and this is the compression of the aorta. By this means we aim to prevent the afflux of blood to the uterus. According to Jacquemier, the first to practise it was Budiger, of Tubingen. He introduced his hand into the uterus and compressed the aorta through the posterior wall. Boer used the same procedure, but Max Saxtorph preferred to compress the vessel through the abdominal wall, and this was advocated, in 1825, by Ulsamer. It is the method in use to-day. Authorities, however, are not at all agreed as to its efficacy, and Jacquemier is one of its decided opponents. Assuming that post-partum hemorrhage is largely venous, he contends that the effects will be different according to the level at which the vessel is compressed. "When compression is applied directly above the ovarian arteries, the slight amount of arterial blood furnished by the utero-placental arteries is cut off, but, at the same time, the stasis of the venous blood in the vena cava inferior is increased, and consequently in the veins of the uterus, and the situation is simply aggravated. The real way of checking provisionally, and more or less completely, the hemorrhage from the utero-placental vessels, is to compress at one and the same time the aorta and the vena cava." Jacquemier further adds that the advice everywhere given to administer ergot, while compression of the vessel is being made, is "both superfluous and irrational. How can this act when the arterial blood does not reach the uterus?"

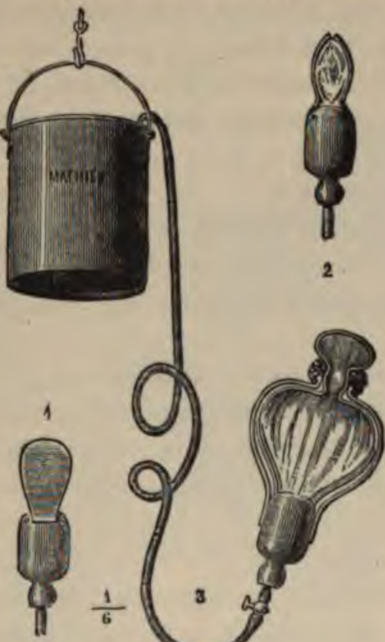


FIG. 154.—CHASSAGNY'S INSTRUMENT FOR CONTROLLING UTERINE HEMORRHAGE.

However much I respect the opinion of Jacquemier, whatever the value of his theoretical objections, this theory must yield to facts, and I believe that compression of the aorta is an excellent means of checking hemorrhage, since it has succeeded well in three cases where I have resorted to it. I will not say that the result was due to compression alone, since others means were used, but it proved an excellent adjuvant. I resort to compression as follows: The woman lies on her back, the legs and thighs flexed, and the left hand depresses the abdominal wall above the fundus, a little to the left of the mid-line. As soon as the vessel is found, it is compressed against the vertebræ by three fingers, for about fifteen minutes, when an assistant relieves the operator if his fingers are tired. The pressure exerted should be uniform, not forcible. To be of use, compression should be prolonged for fully one hour, until, in a word, the uterus is well and thoroughly contracted.

The last method at our disposal, and which should be resorted to when all other means have failed, is transfusion. This has given satisfactory results.

We have now passed in review the main cause of post-partum hemorrhage--inertia of the uterus. For other causes, rupture of a thrombus, tumors, polypi, cancer, the reader is referred to the sections treating of them. We pass at once to a further prime cause, the

Inversion of the Uterus.

With William Newham, three degrees may be recognized: 1. Simple depression. 2. Partial inversion. 3. Complete inversion.

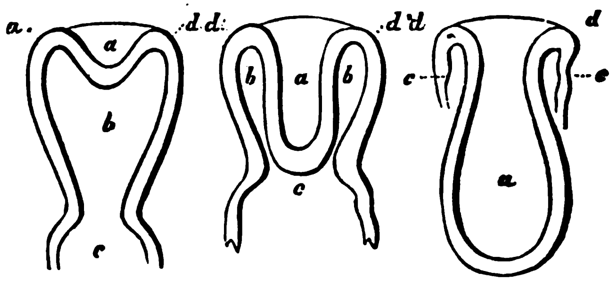


FIG. 155.—DIFFERENT DEGREES OF UTERINE INVERSION.—*a*, Fundus, uteri inverting. *b*, Uterine cavity. *c*, Vagina. *d*, Upper border of the cup formed by the inversion.

In simple depression the fundus sinks into the cavity, but forms no tumor in the vagina. Only by combined manipulation can we recognize this variety. In partial inversion, the fundus sinks into the vagina, forming a voluminous tumor, surrounded exactly by the orifice of the cervix. (Fig. 156.) In complete inversion, the uterus projects outside of the vagina and the vulva. The organ is detected no longer in the hypogastrium, and the os is felt at the upper part of the tumor surrounding it like a ring. (Fig. 157.)

As Courty has well said, "a combination of varied conditions are necessary, in order that inversion may take place. Usually it occurs after labor at term, 350 times out of 400, according to Crosse, but also after miscarriage and premature labor; cases of Spaeth at five months, of Brady at five months, of Woodson at four months. It may, however, be determined by the presence of a fibroma or a polyp (Fig. 158), either during their spontaneous expulsion, or during efforts at removal. Inversion, however, compared with the other complications of the birth of the fœtus, or the expulsion of tumors, is rare, and has doubtless, often, been mistaken for prolapse."

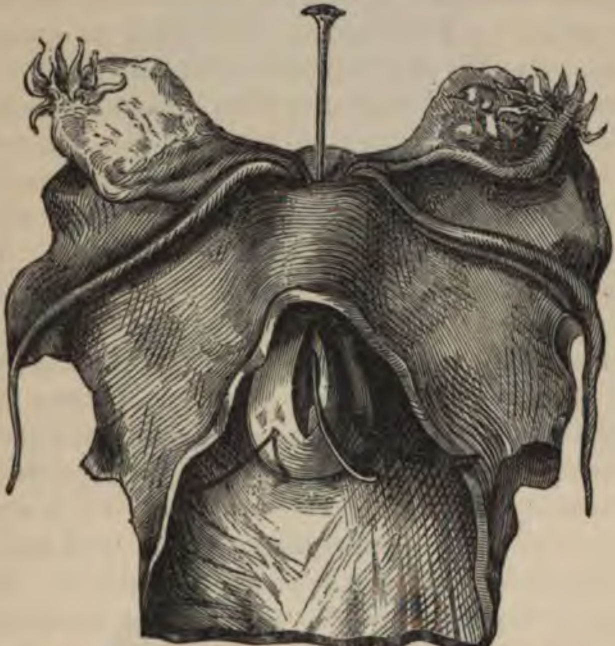


FIG. 156.—INCOMPLETE INVERSION OF THE UTERUS. (*Denucé.*)

The conditions which favor inversion are, in general, uterine inertia, sinking of the walls of the uterus, pressure on the organ from above or traction from below. Exceptionally, it may occur spontaneously, and although Depaul doubts this, the cases of Ruysch, Corvan, Saxtorph, Radford, Simpson and West are incontestable.

In case of labor, Courty says that the inversion may occur at two different periods: "1. At the moment of the expulsion of the fœtus, through inertia of the uterus, and traction exerted by the fœtus on too short a cord, the parturient being erect. 2. During the third stage, owing to utero-placental adhesions. In these instances inversion may, at the outset, be incomplete, and is rendered complete through the expulsive efforts of the woman, the pressure of the abdominal contents, etc."

The majority of writers believe that there are certain factors indispensable to the production of inversion. Rokitansky lays stress on paralysis of the organ at the placental site. This site, not participating in the contraction of the remainder of the organ, terminates, as it were, in the uterine cavity, and palpation detects a cupping at this point. This is the first degree of inversion, and, once present, it tends to progress in part through the influence of uterine contractions, in part from the weight of the intestines, ovaries and tubes which sink into the depression. (V. Fig. 156.) Lazati contends that not only is partial uterine inertia present, but also total. Hunter insists on irregular contraction of the uterus, as the prime cause of inversion. The depressed portion becomes a foreign body in the cavity, and the uterus contracts, to get rid of it, even as happens in inversion of the vagina. Henkel invokes after-pains; Siebold atony of the uterus, associated with precipitate delivery. Boivin and Dugès inertia of the uterus, especially if, at the time, traction is made on the cord. Tyler Smith and Radford lay stress on the same causes.

[In the *American Journal of Obstetrics*, October and November, 1885, Crampton of New York published a paper on inversion of the uterus after labor, and tabulated 120 cases of acute inversion, and 104 of chronic inversion, the line between the two classes being drawn at one month. Of the first series 87 recovered, 32 died, 1 remained unrelieved. In twelve instances, the patient was *in extremis* when first seen. Of the second series, 91 recovered, 7 died, 6 remained unrelieved. The average mortality from both series is nearly 20 per cent. The conclusions the writer reached from a study of these cases are, in brief: Inversion of the uterus is preceded by paresis of some portion of the uterine muscle, not neces-

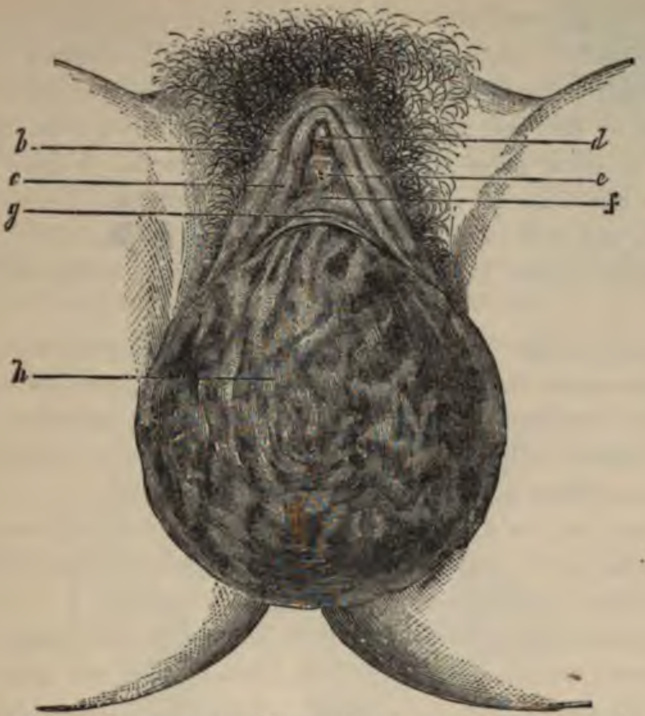


Fig. 157.—Complete Inversion of the Uterus.—(*Boivin and Dugés*)—Caused by hasty extraction of the placenta. *a*, Mons veneris. *b*, Labia majora. *c*, Labia minora. *d*, Clitoris. *e*, Meatus urinarius. *f*, External anterior surface of the vagina. *g*. External anterior border of the external os. *h*, Internal surface of the uterus which has become external.

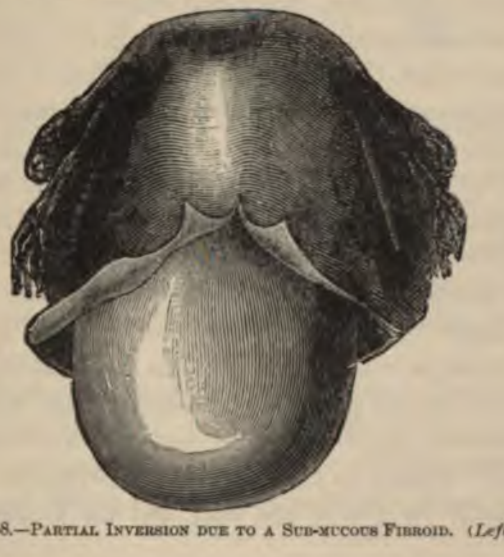


Fig. 158.—Partial Inversion due to a Sub-mucous Fibroid. (*Lefour.*)

sarily of the placental site, the main causes being too frequent child-bearing, tedious labor, repeated miscarriages, traumatism, emotions (especially in primiparæ), precipitate labor. "It is a pure neurosis in its inception." Traction on the cord may cause prolapsus, but never alone inversion; for this to occur paresis must be present. Inversion is more likely to occur in first than in subsequent deliveries. Chronic inversion would rarely be met with if every physician adopted the custom of repeated and careful vaginal examinations after every labor within twenty-four hours.

We would suggest that the routine palpation of the abdomen, at each visit, is an ample precautionary measure. We are opposed to vaginal examination after labor, except in the presence of strict indication.

For detailed analysis of the main causes of inversion we refer the reader to this interesting paper.—Ed.]

For our part, we are inclined to side with Rokitansky's view, for we believe that, in the majority of instances, the cord will break before the uterus yields, in case inertia of the uterus is not present.

The phenomena accompanying inversion are, at the outset, painless, to become intensified as the process increases, and the pains are the greater the more sudden the inversion. As a general thing, the hemorrhage is not serious, although it may be profuse. Cases have been reported where there has been absolutely none, such as those of Brown, Chapman, Hamilton, Daillez, Burns and others. The chief symptoms are: Acute pain accompanied by the presence in the vagina of a more or less voluminous tumor, limited above by a ring formed by the cervix, depression or absence of the uterus from the hypogastrium, at times projection at the vulva of a livid red tumor, to which the placenta or a fibroid may be adherent, hemorrhage, syncope, all these phenomena occurring so to speak, instantaneously. Such are the symptoms of recent inversion, with which alone we are here concerned.

In case of inversion with the placenta still adherent, should we first remove the placenta or reinvert the uterus, with the latter adherent? The answer for us is self-evident. We should only reduce the inversion after the removal of the placenta. The hemorrhage will thus possibly be a trifle increased, but the volume of the uterus will be diminished.

The prognosis depends on the rapidity of intervention. Reduction is the more difficult the greater the delay, and the greater the delay the more serious becomes the condition of the woman. Finally, the intestine may lie in the depression, and is there subject to strangulation.

If the uterus is in a condition of inertia, the whole hand should be inserted into the vagina, and with the closed fist the projecting portion should be pushed up, the other hand externally taking account of the progress. Spiegelberg, with justice, lays stress on the point that pressure should be made particularly in the pelvic axis, to avoid impingement on the sacral promontory. If the cervix is contracted around the tumor, Kilian and MacClintock advise grasping it in the palm of the hand, so that the fingers lie at the constriction. The uterus is then to be compressed so as to push through the os first the portions which were inverted last, pressing up, at the same time, the fundus with the palm of the hand. Reduction once accomplished, the hand should remain in the uterus until the organ contracts regularly, and ergotine should be administered subcutaneously.

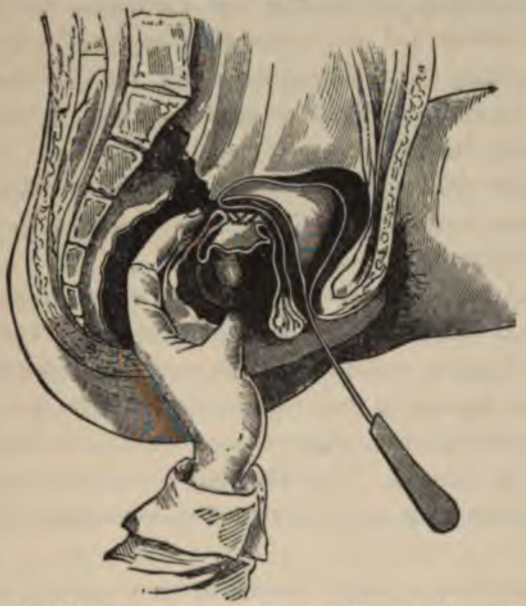


FIG. 159.—REDUCTION OF THE INVERTED UTERUS. (*Barrier.*)

Meissner recommends the following procedure: The tumor is grasped by four fingers of each hand, and the thumbs are applied to the lowest part of the fundus uteri. At this point the aim is to make a depression, and to increase this by gradual and moderate pressure. Courty and others recommend section of the constricting ring. Longitudinal incisions are to be made so as to cut the circular fibres of the isthmus, one in front, and another posteriorly. Courty substitutes for Barrier's method the following: "The cervix is immobilized by two fingers in the rectum, while the fingers of the other hand endeavor to push the tumor through, pressure being made towards the pubes, (instead of towards the sacrum, as Barrier advised.) The fingers in the rectum hold the cervix towards the sacrum, being spread widely apart, between the utero-sacral ligaments." Tate proceeds as follows: With the patient in the dorsal decubitus, the two thumbs are inserted into the vagina, two fingers of one hand into the rectum, and the index of the other into the bladder. These fingers aim at fixing and steadying the cervix, while the thumbs press on the tumor at its centre, and seek to push it through the cervix, which is distended by the fingers in the rectum and bladder.

Finally various instruments have been devised as redressors, but all authorities agree in considering them more dangerous than useful, and in giving preference to the hand.

[The best method, possibly, of overcoming a recent inversion, is that of Noeggerath. It has yielded the best results of any. It consists in placing the index finger on one cornu of the uterus, and the thumb on the other, and in endeavors to push in first one and then the other. When this has been accomplished, pressure is made at the centre of the inverted mass, until it is reduced. The other hand, externally, makes counter-pressure. Whatever the method resorted to, anæsthesia is a pre-requisite to success.

As for the methods of use for the reduction of chronic inversion, they do not belong here. Mundé gives a succinct account in his *Minor Surgical Gynecology*.—Ed.]

SECONDARY PUERPERAL HEMORRHAGE.

Hemorrhages of this nature are less grave than those we have just described, but they may be serious in their complications. When primary inertia has been overcome, we must not fall into the error of believing our patient safe, for frequently secondary inertia sets in. If we do not carefully watch our patient this may pass unnoticed, and all may be lost at a time when we thought all was gained. At the end of a variable period, from a few minutes to a few hours, hemorrhage occasionally recurs, and the patient is, of course, in a very bad condition to withstand this recurrent loss of blood. Whence the stringent rule, when once we have overcome a hemorrhage, not to leave our patient for some hours, and to keep her quiet in the bed where she was confined, without attempting to change the sheets or to disturb her in any way.

There are two symptoms which will foretell the impending hemorrhage. The one from the side of the uterus, which, instead of being hard and globular, is soft, extends above the umbilicus, and on pressure gives exit to blood; the other, from the side of the pulse, which is very frequent and small.

The explanation of this secondary hemorrhage is the following: Delivery has been regular, the third stage normal, and the loss of blood moderate. Precisely because this loss is moderate, has it a tendency to coagulate, and there forms in the cavity a clot which keeps the uterus from contracting, and leads to deficiency in retractility. The uterus is kept at an increased size. Ordinarily, at the end of a variable time, the woman has a few after-pains, and expels the clot, but frequently there results profuse hemorrhage, both internal and external. In such cases we must resort again to the treatment applicable to primary inertia.

In order to forearm themselves against this late hemorrhage, certain accoucheurs are in the habit of giving ergot to all their patients. We believe this practice more harmful than the reverse, for in such cases, we often see small clots, retained in the uterus, putrefy and become the starting-point of puerperal complications. [We have elsewhere given our reasons for disagreeing with the author. We simply repeat here that the routine administration of ergot, by keeping the uterus firmly contracted, prevents largely the formation of clots.—Ed.]

In other instances, the puerperium progresses normally for forty-eight hours, and even longer, when hemorrhage occurs, without, at first sight, known cause. In the majority of cases, it is due to the neglect or error of the accoucheur. There has, perhaps, been left a portion of the afterbirth in the uterus, which would not have happened had the placenta been carefully examined. If we examine these patients, indeed, there will often be found engaged in the cervix a shred of placenta or membrane, and when this has been extracted, the hemorrhage ceases. Sometimes, however, the accoucheur is not at fault, where, for instance, the placenta has been closely adherent, and it has been impossible, except at the risk of injury to the patient, to remove all. In such cases the hemorrhage is really salutary, for it indicates the separation of these adherent portions, which might otherwise putrefy. Finally, in certain cases of supernumerary placentæ, we meet with these hemorrhages, and yet the accoucheur could not have suspected the existence.

There is still a further variety of secondary hemorrhage occurring towards the twenty-fifth to the thirtieth day, even later. It occurs both in women who nurse, and in those who do not. In the first instance it seems as though the irritation of the breasts interferes with involution. If it become at all profuse, the indication is to stop lactation, and to give ergot. Hot injections sometimes cause the cessation of these hemorrhages. Hot general baths have yielded us the best results. (See Vol. I, under the Puerperium.)

In women who are not nursing, the uterus remains large and voluminous. Absolute rest, ergot, hot baths constitute the treatment.

[In these late varieties of hemorrhage, the cause is almost invariably sub-involution, and the treatment called for is similar in nature. If the woman were otherwise in good condition, we would not put a stop to lactation, and we believe that the necessity for this is very exceptional. We would treat the case as follows: Place the woman in Sims's position, and through the speculum determine the cause of the hemorrhage. Often the prime cause is a lacerated cervix, frequently an erosion of the everted mucous membrane. Here, unless it seem appropriate to repair the cervix, applications of nitrate of silver ʒ j to ℥ j to the erosion, will temporarily check the flow. In case the hemorrhage comes from the uterine cavity, the dull curette should be passed over the endometrium to satisfy ourselves that there is no foreign body (polyp, shred of placenta, vegetation, etc.), and then, on a cotton-wrapped applicator, Sims's slide applicator may be used when we wish to temporarily tampon the cervix, a stypic solution, (the compound tincture of iodine, or alum and glycerine, or iron and glycerin) should be applied to the endometrium. Rarely will the hemorrhage of sub-involution pure and simple not yield to this measure. The best after-treatment is ergot and cannabis indica, five grains of the one and $\frac{1}{8}$ grain of the other, by the mouth or rectum, or else ergot combined with the fluid extract of cotton root (*gossypii radicis*), and, every other day, for fifteen minutes, faradization of the uterus, or, what answers as well, the interrupted galvanic current. The hot douche, twice daily, is a valuable adjuvant.

We plead, in particular, for non-interruption of lactation, except where these measures fail or there is other indication.

As a not uncommon cause of secondary puerperal hemorrhage, we would note the premature resumption of sexual intercourse. We have in mind two cases, one on the fifteenth day the other on the twenty-sixth, where the congestion induced by copulation was the only possible cause for the hemorrhages.

Mundé, in a paper read before the Academy of Medicine in January, 1883, on the subject of secondary hemorrhage, in his review of the causes, mentions, in addition to those which we have already noted: hemophilia, functional disease of the liver, malarial poisoning, and disease of the inner surface of the uterus.—Ed.]

Finally, the mere presence of the husband in the wife's bed may provoke secondary hemorrhage, even as late as the fourth week. I have seen two instances in young hyperæsthetic women. The treatment, of course, consists in banishing the cause.

At the end of six weeks, rarely earlier, the woman again has a flow, but this time it is physiological, being the return of the menses, and very frequently they are more profuse than was customary before conception, and ergot in small doses, with rest in bed, are called for.

CHAPTER II.

DYSTOCIA DUE TO THE FŒTUS.

DYSTOCIA from the side of the fœtus may depend on its annexes, in particular the cord, or on the fœtus itself.

DYSTOCIA DUE TO THE FŒTAL ANNEXES.

Anomalies of the Cord.—We have already studied the anomalies (See Vol. I.) of the cord, which may interfere directly or indirectly with the fœtus. We will now pass in review the most frequent cause which renders delivery dangerous to the infant, prolapse of the cord.

Prolapse of the Cord.—Under the name procidentia, prolapsus, falling of the cord, we mean the engagement of a portion in front of or near the portion of the infant, which is presenting. Naegelé and Schuré make two divisions, according as the membranes are ruptured or not. In the first instance, the cord presents, in the second it is prolapsed. The first is inevitably converted into the second, unless it corrects itself spontaneously. Jacquemier makes three divisions: Presentation before rupture of the membranes, incomplete prolapse when the cord lies in the vagina, complete prolapse when it hangs externally. As Depaul says, these subdivisions are of no moment, for the danger and the indications are similar in each. Deneux says that procidentia of the cord may be met with at and before term, but usually it occurs only when the cervix is notably dilated. It is rare when the fœtal part reaches the excavation, and rarer still, of course, at the inferior strait. Naegelé has recorded a case. It varies with the length of the cord, and it usually occurs in the neighborhood of the sacro-iliac synchondroses, infrequently in front of the sacrum, or behind the symphysis. The cord may be tense or loose. The descent may further be complicated by the presence of the fœtal extremities, by knots, twists, placenta prævia.

Frequency.—It is far from rare, and the figures given by the authorities vary infinitely. Thus:—

Manzoni	found	it in	1	out of	22	labors.
Carus	“	“	1	“	26	“
Stoltz	“	“	1	“	69	“
Hart	“	“	1	“	80	“
Michaelis	“	“	1	“	92	“
Clarke	“	“	1	“	156	“
Richter	“	“	1	“	156	“
Lachapelle	“	“	1	“	592	“
Mauriceau	“	“	1	“	18.1	“
Schuré	“	“	1	“	265	“
Depaul	“	“	1	“	116	“
Churchill	“	“	1	“	221	“
Naegelé and Grenser	“	“	1	“	123	“
Hildebrandt	“	“	1	“	148	“

Etiology.—These have been well studied by Schuré, who divides them into four groups.

A. Every condition which renders the fœtus more movable. *a.* Abundance of liquor amnii. *b.* Small size of fœtus. *c.* Prolapse of a limb.

B. All causes which give rise to space where the cord may engage. *a.* Naegelé has insisted strongly, in this connection, on want of contraction in the lower segment of the uterus, whence results lack of close approximation of this segment to the presenting part of the fœtus, and hence space into which the cord may fall. *b.* Anomalous positions of the fœtus which act either by making space for the cord, or else by bringing it nearer the cervix. In 124 cases recorded by Hecker, the cord was beyond the normal in length in 92 per cent., having a mean length of 26½ inches. Multiparity would seem to have a notable influence. According to Hildebrandt in 100 cases only 15 occur in primiparæ, and according to Hecker, in case of cephalic presentations, the proportion is 100 primiparæ to 226 multiparæ. *c.* Deformities of the pelvis and displacements of the uterus.

C. All causes which bring the cord near the cervix.

D. Excessive length of the cord, premature rupture of the membranes, precipitate rupture, the woman being erect.

E. Finally, Depaul adds attempts at version by the inexperienced.

Diagnosis.—This is only difficult before the cervix is sufficiently dilated to allow the finger to reach the membranes. If the fœtal part is deeply engaged, and the lower uterine segment very thin, we may, exceptionally, feel the pulsations of the cord through this segment. These pulsations may be differentiated from those which are normally felt at the utero-vaginal junction, by the fact that they are not isochronous with the maternal pulse. Where, on the other hand, the presenting part is elevated, the cervix dilated and a portion of the membranes accessible, the diagnosis is possible. Then, either during the contractions, or in the intervals, a body is felt, not voluminous and floating, under the exploring finger. The nature of this body is recognized by the fact that it pulsates isochronously with the fœtal heart. If the fœtus is dead, this sign of course fails, but then the diagnosis is of no importance. The membranes once ruptured, the diagnosis is a simple matter, when the cord is in the vagina. Its pulsations, the possibility of hooking the finger in a loop, clear away any doubt. The same does not hold true when the cord slips to one side of the head, and remains there during the first stage. Then

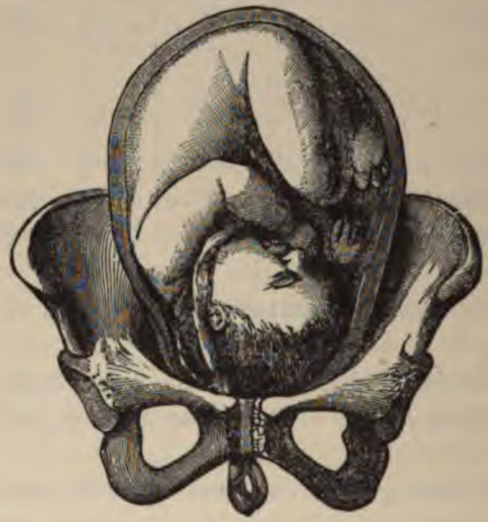


FIG. 160.—PROLAPSE OF THE CORD.

prolapse of the cord is often not diagnosticated, and Depaul says, with justice, that in certain cases where the fœtus dies during labor without appreciable cause, this should be attributed to an unrecognized prolapse of the cord, aside from the compression to which it is subjected in the uterine cavity.

When the cord presents at the vulva, it may appear normal, but often it is greenish, reddish, soft, as if withered. Pulsations may be present, or be lacking. From the absence, however, we cannot positively conclude that the infant is dead. In a case where the pulsations had ceased ten minutes before our arrival, as attested by the attending physician, immediate version delivered an infant apparently dead, but which was resuscitated by insufflation and survived.

Prognosis.—If prolapse of the cord is of no moment as regards the mother, it is an accident which seriously compromises the life of the child. Thus:

Scanzoni and Churchill	place the mortality at		53 per cent	
Hecker	" " " "		37.6 "	
Lebmacher	in	50 cases	had 49	deaths
Hüter	"	28 "	" 21	"
Michaelis	"	27 "	" 20	"
Stoltz	"	56 "	" 52	"
Schweighauser . . .	"	25 "	" 25	"
Depaul	"	143 "	" 96	"

There are a number of circumstances which influence the prognosis. According to certain writers, thick cords run less risk than thin. This is illusory, but it is different with the variety of prolapse, the position of the fœtus, the part of the pelvis at which the prolapse occurs, the amount of the cord which is procident. Presentations of the head and breech are the most dangerous attendants on the prolapse, and when the procidentia occurs at the sides of the pelvis, it is less exposed to compression than at the anterior or posterior portion. Finally, the conformation of the pelvis, the duration of labor, the degree of the contractions, have an influence. Every cause which retards labor, of course influences the prognosis for the child. Further, the nature of the interference modifies the prognosis.

Results of the Prolapse.—Prolapse of the cord does not, of course, influence in the least the progress of labor, except in those very exceptional cases where the loop surrounds the head or the breech of the fœtus, and opposes the descent of the presenting part. The consequence of prolapse is death of the infant. What is the cause of its death?

Smellie, Osiander, Schweighauser, Joerg, Hebenstreit, and others, laid stress on cooling of the cord, prolapsed outside of the vulva, and consecutive coagulation of the blood in the umbilical vessels; others, Mauriceau, Roederer, Baudelocque, Siebold, Carus, Meissner, admit refrigeration as an adjuvant cause, but insist, in particular, on compression of these vessels. All modern authors admit only compression as the cause of the infant's death. Kohlschuetter has proved that the theory of refrigeration was based on nothing at all positive, and that in the vagina the cord does not cool, and yet the infant dies if the cord be compressed. Difference of opinion only exists in regard to what vessels are compressed. Some say the vein, others the arteries, others both vein and arteries. Mittelhauser, May, Wigand, Deneux, Bartscher, Baudelocque, who contend for compression of the umbilical vein alone, attribute the death of the fœtus to hemorrhage, anemia, syncope. The fœtal blood is carried to it by the arteries, but cannot return through the compressed vein. There results diminution in the amount of blood, and anemia of the fœtus. Schuré remarks, with justice, that the spiral arrangement of the vessels in the cord, will not permit of compression of the vein alone, and further that we ought to find the placenta gorged with blood, which is not the case.

Ruhland, Adolph, Faust, Gehler, contend for compression of the arteries only, and that there results congestion in the fœtal viscera, and the infant dies of apoplexy.

Finally, others contend for compression of all the vessels, and Hebenstreit attributes death to the accumulation of blood in the heart, Adolph in the lungs; Waldkirsch believes in cerebral apoplexy, either primitive or secondary. Now in cases of fœtuses dead from compression of the cord, we find neither anemia, nor hyperæmia, nor apoplexy, and therefore Schuré and all accoucheurs are in accord in the belief that the fœtus dies from asphyxia. Even as the adult has need of oxygen in order to live, so too the fœtus. But whilst man gains his oxygen from the external air, and his food from the intestine, the fœtus acquires its oxygen from the maternal blood, through the placenta and the cord. The products of retrograde metamorphosis return to the maternal blood from the fœtal. If this interchange between the mother and the fœtus is interrupted, the fœtus asphyxiates and dies. In the normal state the fœtus is in a condition of apnea, that is to say it does not need to respire, since it acquires otherwise a sufficiency of oxygen. Under normal conditions this state is only modified after the birth of the infant, and the infant only makes its first respiratory movement at birth. But if the cord is compressed, and if, in consequence, the regular supply of oxygen is suppressed, the infant ceases to be apneic, it makes an inspiratory movement, and the consequences of this first act are: 1. Suppression of the placental circulation, or at least notable diminution, lowering of the blood pressure in the right ventricle under the influence of the enormous sudden dilatation of the pulmonary arteries; 2. Suction into the respiratory passages of liquor amnii. The oxydation of the fœtal blood does not occur, and the inspiratory acts recurring and drawing more and more into the thorax the blood from the right heart, and carbonic acid accumulating more and more in the blood, and the excitation of the medulla diminishing, paralysis of the heart ensues, and the infant dies.

Asphyxia may, according as the compression is rapid or slow, occur rapidly or slowly, and hence the two conditions of apparent death in which the infant may appear. Post-mortem, indeed, congestion of the brain, heart and lungs have been found, as also anemia; but these differences are only apparent, and the same lesions are to be detected in the nervous, circulatory and respiratory centres.

In case of compression of the cord, sudden death occurs but rarely, and usually the accoucheur may, so to speak, follow the progress of asphyxia by means of auscultation.

Finally, compression may occur within the membranes before rupture, and in Depaul's opinion, which seems rational, where the liquor amnii is greenish and tinged with meconium, notwithstanding the integrity of the fœtal heart, the explanation is probably to be found in transient compression of the cord.

Treatment.—The treatment varies with the case, and whilst in certain instances only rapid intervention can save the child, in others, on the contrary, haste would be only harmful, and expectancy is indicated.

If the prolapsed cord is diagnosticated within the membranes, we must above all keep these intact as long as possible. The woman should lie down, the buttocks elevated, and but few vaginal examinations should be made. The progress of labor should not be hastened, however prolonged. Birnbaum advocates the introduction of the colpeurynter to sustain the membranes. A Gariel pessary might be used for the like purpose. By means of the colpeurynter, according to Birnbaum, the vagina is distended; if the membranes rupture the waters can escape but slowly, the uterine contractions are intensified. Abegg approves this procedure, but we do not grant it any special advantage, for it is not in the vagina, or in the cervix, but at the level of the superior strait that the cord is subject to compression, and hence the tampon cannot relieve or moderate it.

As soon as the membranes rupture, an examination should be made to gain whatever information is possible as to the state and the condition of the cord.

When prolapse of the cord has been diagnosticated before rupture of the membranes, Ritgen has advocated placing the woman in the knee-chest position, or in the lateral position on the side opposed to that where the cord has prolapsed. Birnbaum, Ritgen's pupil, affirms that this manœuvre alone has never resulted successfully.

When the membranes rupture and we have assured ourselves of pulsation in the cord, three methods are at our disposal: 1. Abandon the labor to nature, and simply direct and second her efforts; 2. End the labor as soon as possible; 3. Attempt reduction of the cord.

Labor can only be left to the efforts of nature under the following circumstances: where the infant is dead, where the pains are good. We are dealing with a multipara, and where, consequently we may expect the end of labor in a few minutes. If, however, the pains are few and irregular, the pelvis is deformed, the fœtal heart is troubled, the os is rigid, we must interfere. Where the cervix is dilated or dilatable, we should resort to the forceps or to version. Where such interference is impossible, we must try to reposit the cord and maintain it above the presenting part.

Reduction of the cord may be attempted by the hand or by instruments. Manual reduction was employed by Mauriceau, Amand, Deventer, Rœderer, Siebold, d'Outrepont, Busch, Kluge, Michaelis, and others. The latter in 35 cases succeeded 21 times, Lachapelle 14 out of 16. Lamotte, Smellie, Baudelocque, Boer, reject the method, whilst Ritgen, Kiestra, Leopold, Simpson, and others, recommend reposition by posture.

The cord, grasped in the palm of the hand, is to be carried above the internal os and the presenting part, and held there until engagement of the fœtus has taken place, and further descent prevented. Now, when the cervix is sufficiently dilated to allow this manœuvre, it is much more simple to deliver at once by version. When the cervix is not sufficiently dilated then manual reposition of the cord becomes, as Boer has well expressed it, a labor of the Danaids—it is carried up by the fingers and it falls down again. As for the advice to sling the cord around one of the fœtal limbs, it does not seem to us acceptable, for where the cervix is sufficiently dilated to allow of the procedure version is also possible, and this is preferable; in the event of the cervix not being dilated or dilatable, neither method is practicable.

[We do not believe that Charpentier does justice to the method of reposition by posture. Thomas, of New York, in an article published in 1858, amply demonstrates the value of the method, and it is as rational in theory as it is successful in practice. By posture we simply reverse the action of gravity, and in cases where the presenting part is not firmly engaged, the liquor amnii not entirely escaped—in short in cases where the fœtus is still moveable—the cord will often slip back into the upper uterine segment, and will ordinarily remain there if care be taken to keep the patient in the semi-prone position until the presenting part has engaged. It is in the knee-chest position, furthermore, that manual and instrumental reposition should be tried, and the manipulation is in every way facilitated by working through the Sims' speculum. We would not be understood as meaning that reposition of the cord is a simple matter. We desire, purely, to lay stress on the fact that the postural method, under the given conditions, aided it may be by the hand or an instrument, is worthy of greater praise than Charpentier grants.—Ed.]

Numerous instruments have been devised for reposition: the *omphalosoter* of Schöller, modified by Tarnier, (Fig. 161); the cord repositors of Braün (Fig. 162), Naegelé and Scanzoni; the sponge repositors of Osiander, Saxtorph, and others; the slings, elastic rods, etc., of Eckhardt, Wellenbergh, Davis, Simon, and others; Murphy's repositor (Fig. 166), Lambert's (Figs. 163 to 165), and others too numerous to mention. The oldest and simplest method is that of Dudan, modified by Dewees. Naegelé and Grenser describe it as follows: "The cord is surrounded by a loop of ribbon, the ends of which are tied. A portion of the loop is passed through the eye of an elastic catheter armed with a stylet which retains the loop. (Figs.

167, 168.) The catheter is guided by the finger into the uterus, and the stylet is withdrawn, and finally the catheter, leaving the ribbon and cord in the uterus. Of course, care is to be taken not to compress the cord by the ribbon loop."

We have used the following procedure on one occasion, and it succeeded admirably. It is a modification of Dudan's. We surround the cord with a silk loop and we tie this loop tight enough to prevent slipping, and yet not to compress. The terminal ends of the loop we next tie to an olivary elastic, or wax bougie. The cord is thus firmly held at the end of the bougie. We then pass the bougie into the uterus and leave it there, and this is wherein our method differs from others. The cord is not only held in place, but the bougie promotes what we desire, active contractions.

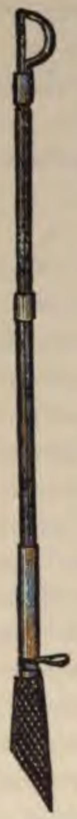


FIG. 161.—BRAUN'S REPOSITOR.

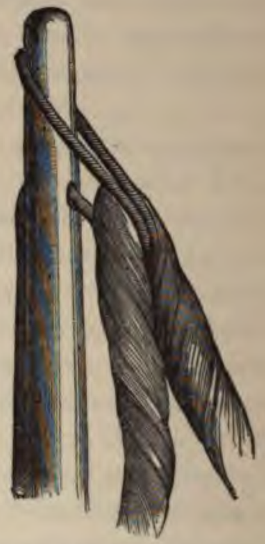


FIG. 162.—SCHOLLER'S INSTRUMENT. (Closed.)

[Without wishing to detract from Charpentier's claim to originality, this method, the best of all, was suggested by Roberton, and has been employed frequently with success. He passed a doubled piece of ordinary twine through a catheter, and out at the eye. The cord is drawn through the twine loop, and the ends of the twine are tied to prevent slipping. The catheter is passed to the fundus with the cord and left there.

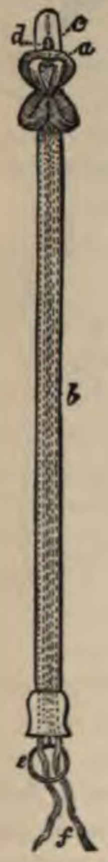


FIG. 163.

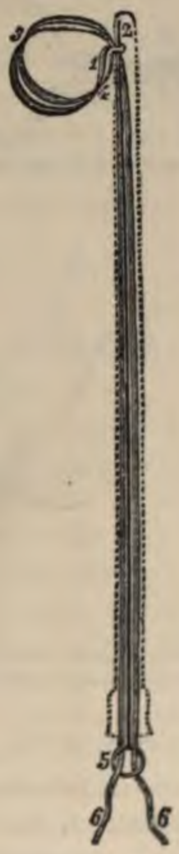


FIG. 164.

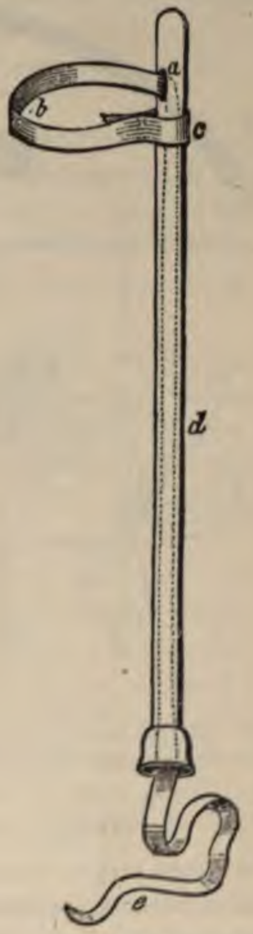


FIG. 165.

FIG. 163.—LAMBERT'S REPOSITOR, (ready for use).—*a*, Double loop. *b*, Elastic stylet. *c*, End of stylet. *e*, Ring of stylet. *f*, Ends of loop.

FIG. 164.—THE SAME, with loop detached to receive the cord, or limb.

FIG. 165.—ANOTHER REPOSITOR, (without stylet).—*a*, *b*, *e*, Loop. *c*, End of loop sewed to the sound, to prevent slipping. *d*, Sound.

Ashford reported a case in the *American Journal of Obstetrics*, for 1878, where he attached the cord to a Gariel pessary, carried the pessary to the fundus, and inflated it. The method was successful.—Ed.]

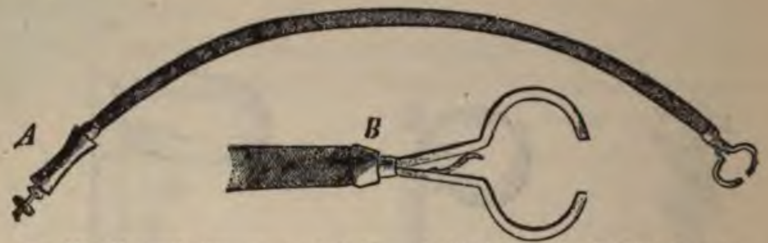


FIG. 166.—MURPHY'S REPOSITOR.—*A*, Instrument with ring closed. *B*, With ring open.

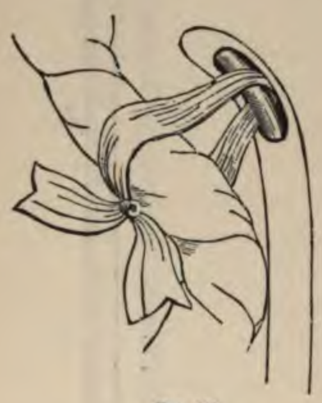


FIG. 167.

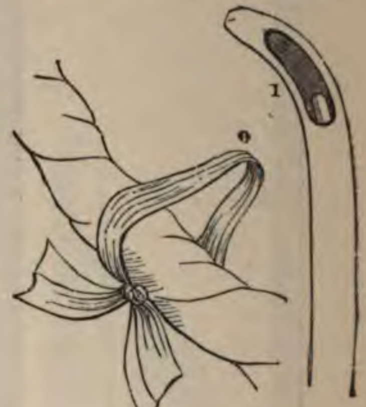


FIG. 168.

FIG. 167.—DUDAN'S INSTRUMENT. Ribbon fixed by the stylet.
FIG. 168.—THE SAME, with the stylet withdrawn to allow the escape of ribbon.

DYSTOCIA FROM THE SIDE OF THE FŒTUS.

The causes may be divided into the six following classes: 1. Excess of volume without pathological alteration. 2. Excess of volume through pathological alteration. 3. Abnormal presentations and positions. 4. Prolapse and vicious position of the limbs. 5. Twin pregnancies. 6. Monstrosities. These we proceed to consider separately.

I. *Excess in Volume without Pathological Alteration.*

This may be partial, limited to the head, or general.

Excess in Volume of the Head.—This cause of dystocia is rare, and although Saxtorph, Voigtel, Credé, Hohl, have reported cases of ossification of the sutures, with and without the presence of Wormian bones, Naegelé and Grenser remark, justly, that there exists no authentic case of labor retarded by this cause alone. The two cases cited by Joulin from Mauriceau and Delamotte, are open to doubt, and, as Cazeaux says, the method of action in such cases is doubtful, seeing that we can only approximately estimate the size of the fœtus while it is in the uterine cavity.

Total Excess in Volume.—The majority of the reported cases are apocryphal. Among the recorded cases we cite: Crantz's case where the fœtus weighed 23 pounds; Cazeaux's and Riembault's, 18 pounds; Depaul's, 12½; Ramsbotham's, 16; Martin's, 15 pounds. We have seen two. In the one, a boy, the weight was 12½ pounds; in the other, a girl, 10 pounds, 1½ ounces.

The age of the patient and the number of anterior labors combine to increase the weight of the child. This has been proved by the researches of Hecker, Veit, Frankenhauser, Wernich. Clarke and Simpson claim a notable difference in case of boys. Hecker and Schroeder admit this, but with greater reserve. Pfannkuch has shown that, the weights being equal, boys have always larger heads than girls, and Schroeder says that, while in young primiparæ it is not exceptional to find a head with the transverse diameter measuring less than 3.7 inches, in old multiparæ, if the child is a boy, the same diameter often measures 4 to 4.5 inches.

The researches of Lumpe, Hecker, Ahlfeld, Bidder, in regard to the weight of successive infants, allow us to draw the following conclusions: 1. The size of the child is greater in old primiparæ than in young. 2. The reverse holds true in case of multiparæ. 3. Boys predominate in very young women, and in those who have passed the age of thirty, whether primiparæ or multiparæ.

It is apparent that when the fœtus weighs as much as in the cases cited above, labor may be prolonged and difficult; but ordinarily it is only where pelvic deformity is associated with increased size that the obstacles to delivery become serious, and then the true cause of dystocia resides, as has been clearly pointed out by Jacquemier, in exaggerated size and absence of rotation of the shoulders.

This cause of dystocia has been mentioned, says Jacquemier, by the ancient writers under two varieties: "In the first, it is supposed that, after the spontaneous or artificial birth of the fœtal head, the large shoulders may present an obstacle to the birth of the body, which the uterine efforts singly, or aided by artificial means, cannot overcome. In the other, the shoulders are supposedly stopped at the brim or in the excavation. The head does not advance beyond the inferior strait, because the expulsory efforts are wasted on the shoulders, and not transmitted to the head. This constitutes Levret's imprisonment of the shoulders." When we speak, Jacquemier further adds, of the volume of the shoulders, we really mean the volume of the thorax. Usually the above varieties of dystocia are conjoined.

According to the same authority, arrest of the shoulders may depend:

"1. In four out of five cases exclusively on the exaggerated size of the thorax and the shoulders.

"2. On lack of proportion between the body of the fœtus and the pelvis.

"3. On acephalic or anencephalic fœtuses.

"4. On absence of rotation of the shoulders, this in turn resulting from inertia uteri.

"The indications for treatment vary, of course, with the cause. If the volume and not the position of the shoulders constitutes the obstacle, then the forceps. If this fails, mutilation of the head, in order to bring down an arm, and by traction on it, to deliver the trunk. If the head has been delivered, either traction on the head, which will often be of no avail, or else the insertion of the fingers in the axillæ and traction. A better method is to first disengage one arm, and then the other, for thus the size of the thorax is diminished."

This is the method which we advocate, but we must act quickly. We will often fracture an arm, or paralyze it, but both these lesions are recovered from in a short space of time.

Excess of Volume through Pathological Alteration.

I. Hydrocephalus.

Under the term hydrocephalus are included all exudations of serum in the cavities of the brain and in its envelopes. We thus exclude the so-called external hydrocephalus, which consists in the collection of fluid between the skin and the cranial bones, and which is purely the result of the uterine contractions, of pressure, or of traction made by the accoucheur. "Under these influences," says Herrgott, "internal hydrocephalus existing before labor, a small amount of the fluid contained within the cranium escapes through one of the sutures and spreads over the external surface of the skull, so as to form a tumor added to the head. This pouch or tumor is simply a diverticulum, so to speak."

Hydrocephalus, then, as we understand it, is purely dropsy of the cerebral ventricles, a dropsy which may spread into the substance of the brain, in the pia mater, into the sub-arachnoidean spaces, and finally between the cavity formed by the reflexion of the arachnoid on to the dura mater.

Frequency.—Hydrocephalus is infrequent. Thus:

Lachapelle . . .	in 43,553	labors	saw	15 cases
Merriman . . .	" 900	"	"	1 case
Lever	" 4,666	"	"	1 case
Hohl		"	"	77 cases
McDonald Ramsbotham . .	" 3,000	"	"	1 case
Kucher	" 12,000	"	"	3 cases

The above figures seem to us too low, for in our two years' service at the Clinique, in 2000 labors we saw three cases, and we have since seen four more in private practice. We believe that Merriman's figures, 1 out of 900, is near the truth.

Causes.—The following causes, more or less hypothetical, have been invoked: Advanced age of the parents, alcoholism, excess in coitus, syphilis, chronic inflammations of the arachnoid and of the internal lining of the ventricle, interference with the venous circulation (Barrier), hereditary cretinism (Herrgott); of all these causes syphilis alone would seem to have a real influence, as proved by the cases of Osiander, Haase, Rayer, Gros, Lanceraux. Against these, however, we can oppose the numerous cases of syphilis without hydrocephalus. In certain women there seems to be a habit of giving birth to hydrocephalic infants, as noted by Franck, Underwood, Gelis, Castelli, Armstrong. Bouchacourt finally insists on the influence of consanguineous marriages.

Pathological Anatomy.—The quantity of fluid in the cranial cavity may vary from a few spoonfuls to a number of quarts. The fluid is like that of dropsy elsewhere, clear, light yellow, containing .246 per cent. of albumin (Hilger), soda salts, and extractives. Where hydrocephalus is complicated by anencephalus, the amount of albumin is greatly increased.

This liquid, distending the cerebral ventricles, pushes the cerebral matter aside, and this atrophies, and tends to disappear with increase in the amount of fluid. In certain cases the brain is converted into a cyst with thin walls. It is apparent that the head may assume enormous proportions. Wrisberg has reported a case where the greatest diameter of the head was 9¾ inches, and the circumference 31 inches; Meckel a case where the bi-parietal diameter was 16⅔ inches, and Verdu (1846) a case where the head was 10 inches long and 30 in circumference.

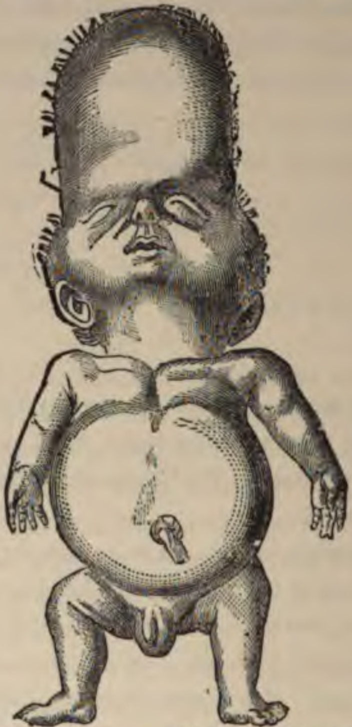


FIG. 169.—HYDROCEPHALIC FŒTUS.—Upper and lower limbs very short. Abdomen voluminous, without ascites. (*Vrolik.*)

The bones are thinned out in accordance with the amount of distension, and sometimes they lose their consistency, and become as parchment. The fontanelles and the sutures, greatly enlarged, fluctuate, and through the intervals project pouches forming encephaloceles. Further, hydrocephalus may be complicated by hydrorachis and other malformations.

The physiognomy of hydrocephalus is always about the same. The face is small compared with the exaggerated development of the skull

(Fig. 169), and the skull may be asymmetrical according as the distension affects one ventricle more than another. Poullet insists on the persistence of the accessory sagittal suture.

We are more particularly concerned with the affection in its relations to pregnancy and labor.

Hydrocephalus during Pregnancy.—Ordinarily the affection is not recognized before the advent of labor. The symptoms during pregnancy are very vague. The size of the abdomen may be normal or increased; and sometimes, by conjoining the signs furnished by palpation, the touch, and auscultation, we may assume the presence of the affection. In the majority of cases, however, diagnosis during pregnancy is not possible.

One striking factor marks hydrocephalus, and this is the association of presentation of the pelvic extremity.

While, where the pelvis and fœtus are of normal size, the vertex presents in 19 cases out of 20, and the pelvic extremity once out of 70 or 80, in the 28 cases of hydrocephalus collected by Chassinat, there were seven presentations other than that of the vertex. Scanzoni, in 152 cases of hydrocephalus, found 30 other than the vertex. Poullet in 106 cases, found vertex in 65, face in 6, breech in 30, shoulder in 8, and in three cases, although not the vertex, not stated. There seems ground for error in these figures, for it is difficult to understand how the face can present at all when we consider the shape of the head in hydrocephalus.

Presentation of the Vertex before Labor.—Sometimes increased size of the abdomen will be noted; again considerable edema of the lower limbs. Again supra-pubic edema, which is also found in case of hydramnion and twin pregnancy. Palpation will often give us the most precise information. If the uterus does not contain much fluid, if it is soft and compressible, we may determine the disproportion existing between the large head and the breech. In two cases Blot made the diagnosis by auscultation from the unusual height of the point where the fœtal heart-sounds were heard.

During Labor.—While the membranes are still intact, the diagnosis is often difficult, but when once ruptured, it becomes easy. The head represents a fluctuating pouch, which might be mistaken for a second bag of waters, but the skin of the head is always thicker, and the hair may be felt. While the sutures and the fontanelles are scarcely recognizable, owing to their exaggerated dimensions, one or another bone of the skull may always be reached, and this will frequently feel like parchment. The cases are not rare where, in the belief that there was a second bag of waters, the brain has been perforated. The caput succedaneum is a further source of error. Further still, where the fœtus is dead and has been retained for some time, the changes determined by prolonged maceration might at first deceive us. The absence of the fœtal heart and of the movements, for some time, and the character of the amniotic fluid, which is like wine-lees, will, however, in this instance, make the differential diagnosis.

As a general thing, labor progresses slowly, and uterine inertia often follows on energetic contractions. The influence of hydrocephalus on labor is, however, variable, and Spiegelberg makes three divisions: Labor is only slightly prolonged, the affection not very marked, and delivery occurs spontaneously. Delivery is still spontaneous, but it is prolonged and painful. Delivery is impossible, and it is here that rupture of the uterus may occur.

In certain instances, where the distension was great, spontaneous delivery has occurred, owing to the formation of a pouch containing the fluid, which enables the head to be compressed, and to pass through the pelvic canal. Sometimes, instead of forming a pouch, the fluid infiltrates the neck and thorax of the fœtus, and even the abdomen, giving rise to a generalized edema, and enabling the bones of the skull to collapse. These cases are exceptional and usually accompany pelvic presentations. Finally where delivery is impossible, the uterus may, as we have stated, rupture. In 74 cases of hydrocephalus, this occurred 16 times. (Keith.)

Presentation of the Pelvic Extremity before Labor.—The diagnosis has never been made.

During Labor.—The progress of labor is characteristic. Everything is normal until the body has been delivered, and then the head does not engage, but is stopped above the superior strait, projecting above the symphysis. Traction is useless, and delivery is only possible through evacuation of the fluid, either artificially or spontaneously.

Prognosis.—This is grave both for the mother and the infant.

Chassinat, in 60 cases, noted the death of the fœtus 41 times before or during labor, and of the 19 remaining, 8 lived less than four months, 5 one year, 2 less than two years, and only 4 over two years. Further, it was only in the instances where delivery was spontaneous that the infants survived. Intervention is absolutely fatal.

Of Chassinat's	28 cases,	all still-born.
Of Ouvrier's	17 "	" "
Of Herrgott's	21 "	20 "

We have been more fortunate. True enough the affection was slight, but we delivered by the forceps an infant which lived 5½ months.

Presentations of the pelvic extremity render the prognosis still more unfavorable.

In case of the mother the prognosis depends purely on the conduct of the accoucheur. Early diagnosis and intervention are in her favor.

In 106 cases Poullet noted 24 deaths
In 94 " Spiegelberg " " "

The mother usually dies from rupture of the uterus, or from traumatism during efforts at delivery.

Treatment.—This varies according as the presentation is of the vertex or the pelvic extremity.

In case of the vertex, as we have before stated, if the affection is slight, spontaneous labor is possible. If the affection is more pronounced, the forceps may be tried, but if after a number of prolonged tractions the head does not come down, we should at once perforate. Certain authors, in the hope of giving the infant a chance, have counselled puncture with a fine trocar. This hope is a vain one. The head must be extracted by the cephalotribe or the bone forceps. We prefer the former. Certain authorities have recommended version. This should never be attempted before diminution of the head, and afterwards we do not see what advantage it offers over the cephalotribe.

In case of presentation of the pelvic extremity traction will sometimes deliver, but also sometimes result in separation of the trunk. Perforation, after one or another fashion, should be the rule. Lacroix and Van Huevel have advocated evacuation of the fluid through the vertebral canal. Tarnier has done this a number of times. He makes an incision with a bistouri down to the vertebræ, and then pushes a catheter through the rachidian canal into the cranial cavity. In 1878, Maggioli succeeded by this method. Indeed, it is so simple that it should be resorted to in every case of pelvic presentation with hydrocephalus. (Fig. 170.)

In certain rare cases, finally, the infants have presented transversely. Tarnier, Koscia, Gripat (1873) have recorded cases. After version, evacuate the fluid as indicated above.

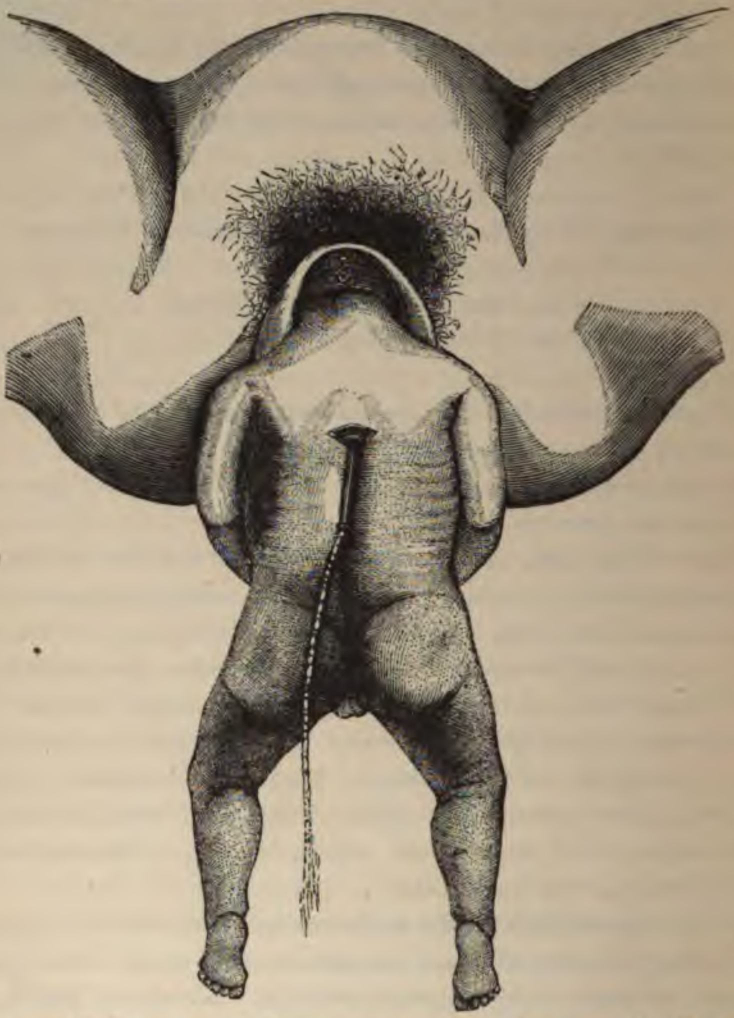


FIG. 170.—HYDROCEPHALUS AND PRESENTATION OF THE PELVIC EXTREMITY. Van Huevel's and Tarnier's Method. (*Herrgott.*)

II. ENCEPHALOCELE.

Larger defines encephalocele as a congenital tumor of the cranium and face, with concomitant lesions more or less pronounced of the brain, and consisting in a larger or smaller diverticulum of the meninges and the brain, rarely the former alone, with or without serous fluid. He unites under this name the four varieties described by Spring, meningocele (Fig. 171), encephalocele (Fig. 172), hydrencephalocele, synencephalocele.

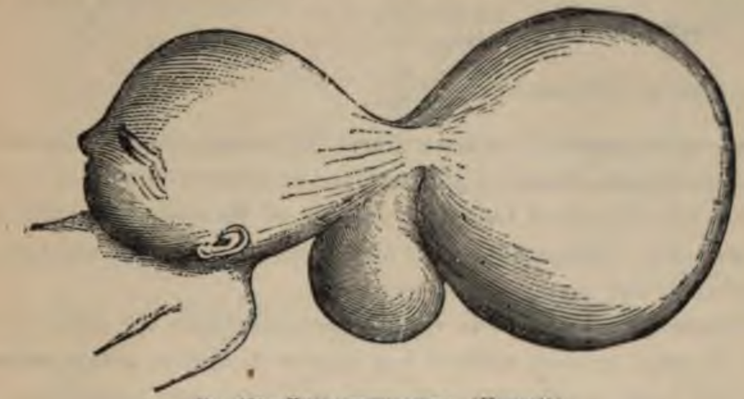


FIG. 171.—HYDROMENINGOCELE. (*Herrgott.*)

He admits three degrees: 1. Tumors in which the bones of the vault of the skull are almost ossified, and where there is simply a hole in the skull. These are the true surgical tumors. 2. Tumors in which almost all the bones of the vault are ossified. 3. Where the skull is almost entirely membranous.

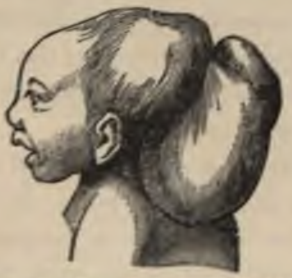


FIG. 172.—ENCEPHALOCELE. (*Vrolik.*)

According to the site of the tumor, he gives the following names:

1st. degree.	No special name for each region.	
2d. "	Fronto-facial region .	Proencephalocele.
" "	Occipital . . .	Notencephalocele.
" "	Interparietal " .	Podencephalocele.
3d. "	Complete exencephalocele.	

Frequency.—Although rare, Larger has been able to collect 98 cases.

In 5000 labors, and over, Vines noted 1 exencephalocele; in 12,900 Trélat noted 3.

Girls are more subject to the lesion than boys:

Larger in 28 cases	Girls,	17.
	Boys,	11.
Spring in 59 cases	Girls,	35.
	Boys,	24.

Seat.—Wallmann in 44 cases found 24 posterior, and 20 anterior. Larger in 85 cases found 41 posterior, and 44 anterior.

Anteriorly the site of election is the root of the nose; posteriorly it is sub-occipital. Encephaloceles are most frequent anteriorly, and hydrencephaloceles and meningoceles posteriorly.

Pathological Anatomy.—In case of exencephalocele the cavity in the bone is round or oval, more or less regular in border, always smooth. The dura mater is adherent to the walls of the sac, and, according to the majority of writers, the fluid is cephalo-rachidian. Larger, however, contends that since exencephaloceles are irreducible, it is difficult to admit that the fluid contents are in communication with the cephalo-rachidian fluid. These exencephaloceles may be accompanied by serous congenital cysts of the neck, by angiomata, lipomata, and other abnormalities of the body. While Spring and others attribute the lesion to hydrocephalus, Larger believes that the production is intimately connected with the development of the skull and the brain.

Symptoms.—The tumor is always constricted at its base, and varies in size from a lentil to the fœtal head at term. It is usually single, at times bi-lobed, is always irreducible, painless on pressure, and only accompanied by reflex action, cries, and convulsions, when it is complicated by meningo-encephalitis. It is translucent or opaque, according to the thickness of the tissues covering it; either solid or fluctuating.

These tumors only complicate labor when voluminous, as in the cases of Ruysch, Deslandes, Tarnier. Labor is speedier when the head rather than when the pelvic extremity presents. If the obstacle to delivery is great, it suffices to puncture the tumor.

III. HYDROTHORAX.

Hohl has reported two cases, and Gottel one. Herrgott has investigated the latter case, and says it was really an ascites. It is indeed exceptional for hydrothorax to exist alone, and to be considerable enough to be a cause of dystocia. Ascites is almost always joined with it, and constitutes the real obstacle. Herrgott cites 8 case of ascites and hydrothorax, collected by Galetti and by Siebold.

IV. ASCITES.

Frequency.—Congenital ascites is very rare. The number of recorded cases amounts to about 50. Van Gelder ranges them under the following heads:

1.	Ascites, simple, ...	13 cases.
2.	“ with hepatic lesions, with or without peritonitis, . .	3 “
3.	“ “ splenic lesions . . .	1 case.
4.	“ “ inflammatory lesions . .	5 cases.
5.	“ “ retention of urine and hydronephrosis, complicated by peritonitis, or not . .	4 “
6.	“ “ retention of urine alone, with or without inflammatory lesions, . . .	6 “
7.	“ “ retention of urine and degeneration of the kidneys, .	3 “
8.	“ “ exudation into cellular tissue or serous cavities, . .	2 “
9.	“ “ hydrothorax, ...	1 case.
10.	“ complex cases, *a.* hypertrophy of liver, hydrocele, edema of the scalp; *b.* hypertrophy of the liver and of the spleen, and peritonitis, . . .	3 cases.

Usually, hence, ascites is complicated by inflammatory lesions of the peritoneum, or by multiple lesions of the abdominal organs. The quantity of fluid varies from one-third of a pound to pints and over, and is ordinarily a yellow serum, sometimes clear and limpid, again greenish yellow, red, probably due to admixture with blood. The peritoneum has been found inflamed, thickened, covered with reddish granulations. The intestines are bound together; the spleen occasionally hypertrophied; the liver frequently altered. Porak found an abscess in the liver. Retention of urine is a frequent complication. The bladder congested, thickened, with or without imperforate urethra. Sometimes hydronephrosis, degeneration of the kidneys by hydramnion, exaggerated development of the placenta, are found. Anomalies elsewhere in the body, imperforate anus, absence of the scrotum, persistent urachus, absence of the cæcum or colon, accompany the ascites. Syphilis is a frequent causal factor.

During pregnancy the symptoms are about *nil.* The development of the abdomen, and the rapidity of this growth, edema, respiratory troubles, diminution in fœtal movements, absence of ballottement, etc., which have been mentioned as signs, are met with in many other conditions, and we cannot, hence, establish a diagnosis by them. It is only during labor that we may suspect ascites. When, after delivery of the head or the breech, the trunk is arrested, we should introduce the hand along the ventral surface of the fœtus. The exaggerated development of the abdomen and fluctuation may thus be determined. But the question will still remain, are we dealing with simple ascites, or with retention of urine? The answer to this question can usually only be made after birth.

The prognosis is always fatal for the infant and for the mothers; it depends on the method of intervention.

The only way of ending labor is by puncture, by means of a trocar. In many cases the finger has served as perforator.

V. DISEASES OF THE URINARY SYSTEM.

a. *Diseases of the Ureters and Cystic Degeneration of the Kidneys.*—These affections are rare.

b. *Retention of Urine in the Fœtus.*—The most frequent cause of dystocia from the side of the urinary apparatus is retention of urine. The first authentic case of this nature was reported by Portal in 1685. (Fig. 173.) Depaul wrote a monograph on the subject in 1850. In the majority of recorded cases, there has existed in addition to imperforate urethra other complications. Joulin, however, notes that in certain instances the canal is not imperforate. Ordinarily, as shown by Herrgott, the vertex presents, and puncture of the bladder is therefore rendered difficult. The infants are rarely born alive, and then usually die in from a few hours to a few days.

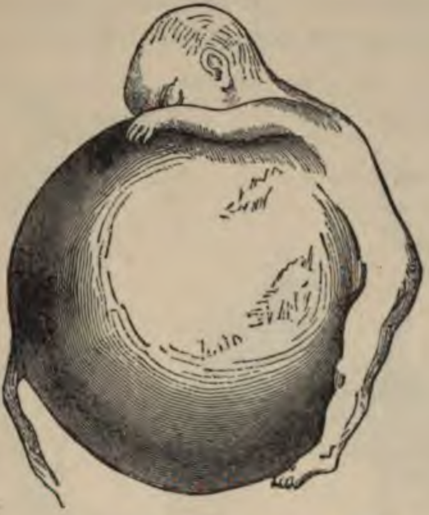


FIG. 173.—RETENTION OF URINE IN FŒTUS.

The guide for puncture is the insertion of the cord. Often retention of urine is complicated by ascites. Both fluids must here be evacuated.

VI. DISEASES OF OTHER ORGANS.

Haase and Noeggerath have recorded a case of dystocia, due to hypertrophy of the liver; Letulle a case of syphilis and hepatic tumor; Kollsch a case of hernia of the liver; Martin a case of hypertrophy of the pancreas with ascites; Mangin a case of hypertrophy of the spleen with ascites, also Voss; Gervis a case of excessive distension of the fœtal uterus; Rogers a case of cystic degeneration of an undescended testicle; Phenomenow a case of large aneurism of the aorta.

We will see further on that fœtal inclusion may become a cause of dystocia.

VII. TUMORS OF THE ANO-PERINEAL REGION.

Writers have divided tumors of this nature into various classes. In 1862 Braün stated the following divisions: 1. Tumors connected with the spinal canal. 2. Degenerations of Luschka's gland. 3. Sacral hygromas. (Figs. 174 and 175.) 4. Coccygeal and sacral fibromas, cysto-fibromas, cysto-carcarcinomas, etc., (Figs. 176, 177.) 5. Hydrorrachis (Fig. 178.) 6. Lipomata. 7. Tumors found in adults, and the congenital nature of which has not been proved. (Figs. 179, 180.) He has been able to collect 95 cases of the above varieties. In 1868, Molk collected 107 cases.

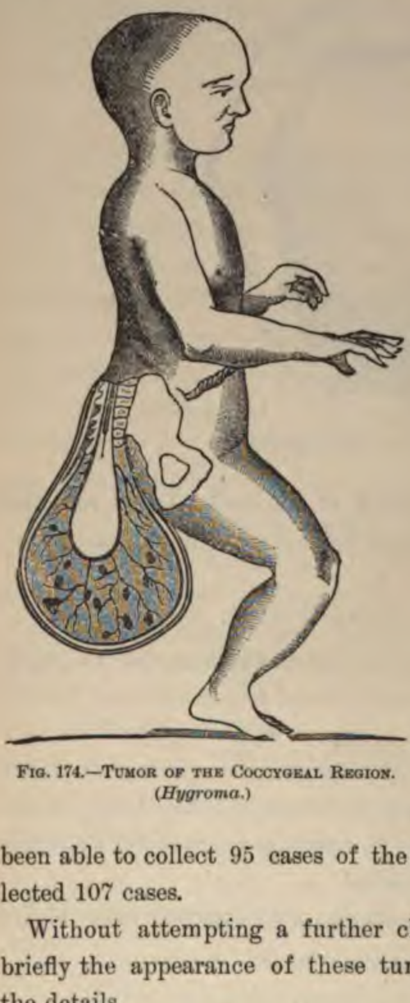


FIG. 174.—TUMOR OF THE COCCYGEAL REGION. (*Hygroma.*)

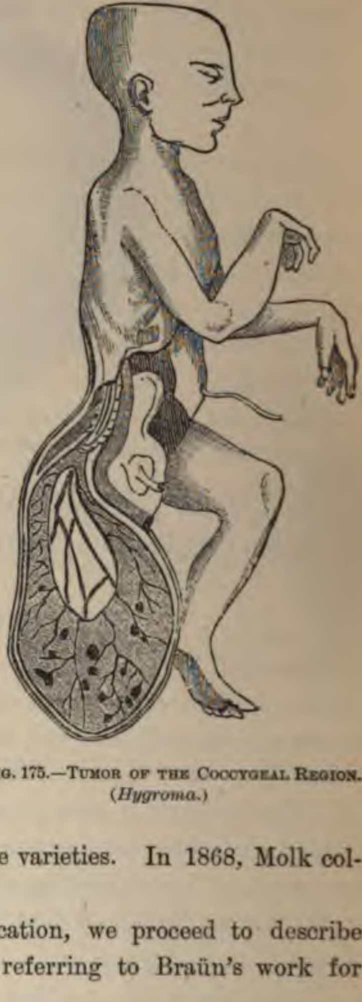


FIG. 175.—TUMOR OF THE COCCYGEAL REGION. (*Hygroma.*)

Without attempting a further classification, we proceed to describe briefly the appearance of these tumors, referring to Braün's work for the details.

In shape these tumors are, in general, either hemispherical or elongated; their surface is smooth, sometimes irregular, and they vary in size, occasionally reaching even to the heels. They usually project from the sacrum or the coccyx. In certain instances, a second tumor, within the abdomen, connects with the external. The external covering is formed by the skin, a fibrous membrane, and a mucous membrane. The skin is tense and traversed by dilated vessels. The contents are solid and liquid. The former consist of embryoplastic tissues (Depaul), and remnants of normal tissue (Molk, Duplay.) Fat and multiple serous cysts are also found. They are sometimes not attached to the bones, as in a personal case, and again adherent to the sacrum and coccyx. The pedicle may be long or short and is usually vascular.

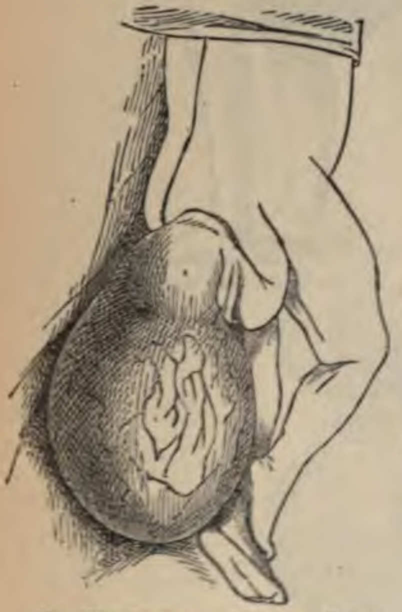


FIG. 176.—CYSTO-FIBROMA OF THE COCCYGEAL REGION.

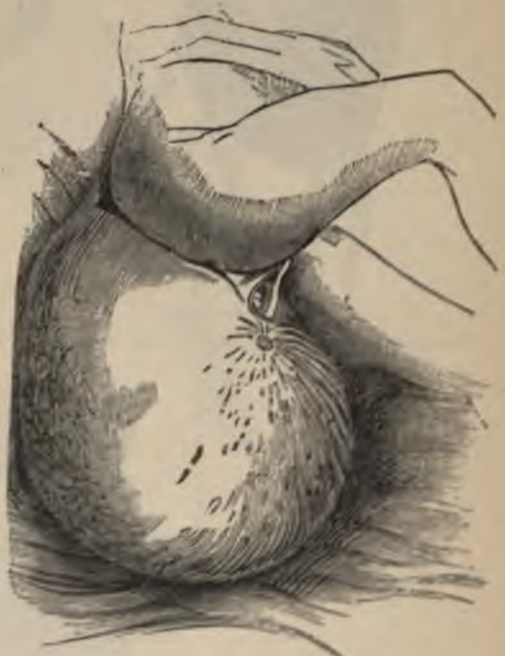


FIG. 177.—CYSTO-CARCINOMA OF THE COCCYGEAL REGION.

Alongside of the tumors which are evidently the result of fœtal inclusion, we find tumors communicating with the rachidian canal, and consisting in either hydrorrachis with spina bifida (Fig. 178), or of hernia of the membranes or of the cord itself. Braün has described a tumor which he calls papillary, and which is made up of villous elements.

In other instances, these tumors are absolutely independent of the spinal canal. Braün and Duplay have described cysts, sarcomata, cysto-sarcomata, fibromata, cysto-fibromata, lipomata, caudal tumors formed by supernumerary coccygeal vertebræ.

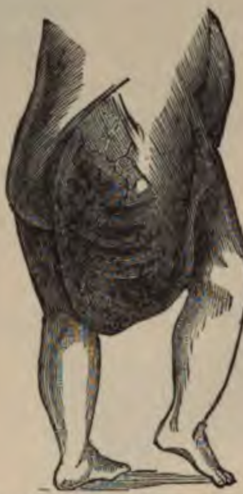


FIG. 178.—COCCYGEAL TUMOR WITH SPINA BIFIDA.

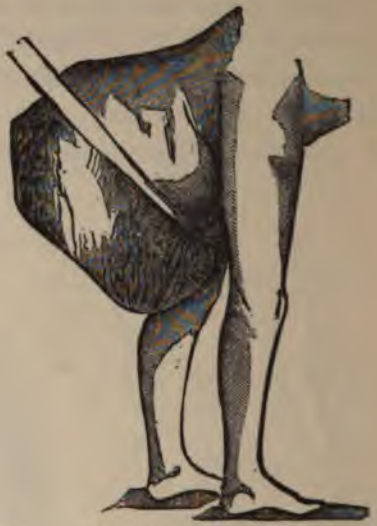


FIG. 179.—COCCYGEAL TUMOR.

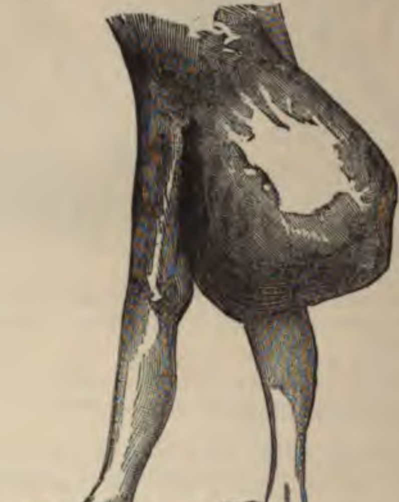


FIG. 180.—COCCYGEAL TUMOR.

These tumors may occasionally interfere with labor, and the course of action varies according as they are solid or liquid. If it is liquid, puncture; if it is solid, it must be broken up. Labor is more difficult when the pelvic extremity presents.

VIII. SPINA BIFIDA.

Spina bifida appears as a tumor situated the length of the spine, in the median line (Fig. 181.) It is usually found in the lumbar region, then in the lumbo-sacral and sacral regions. It may be met with in the cervical region. The dorsal vertebræ are rarely affected. Ordinarily it is no larger than an egg. It is usually round or oval, its greatest diameter being vertical. The cervico-dorsal region is the seat of predilection of pediculated tumors. The cavity communicates with the rachidian canal. In the dorsal region the tumor is almost always sessile. Generally, the coverings are the skin, the subcutaneous cellular tissue, the dura mater.

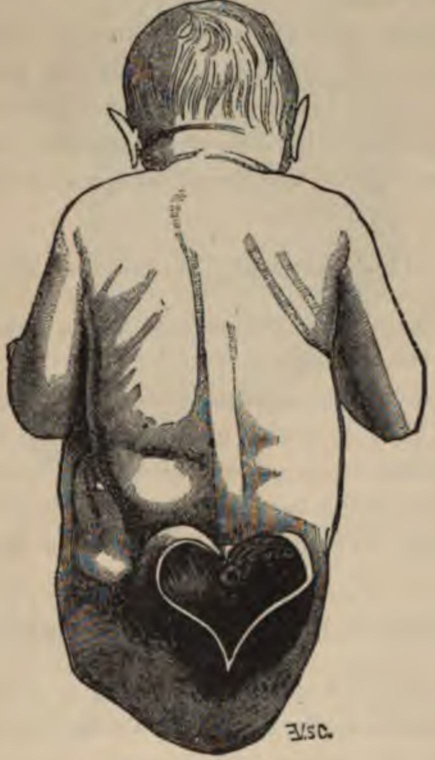


FIG. 181.—SPINA BIFIDA.

The tumor may be perfectly transparent. At times the liquid escapes through an ulcerated spot in the skin. The contained liquid is the cephalo-rachidian fluid, and in the lumbar and lumbo-sacral regions either the marrow or nerves are included. When the marrow is inserted on the posterior wall of the tumor, a depression exists on which Virchow lays great stress. At times it is spread over the inner surface of the tumor, or floats freely in its cavity. The opening of the spinal canal is due to a defect in ossification of the bodies and spinous processes, involving usually three to four vertebræ.

Spina bifida, while frequently existing alone, is often complicated by other anomalies in development. The lesion does not seem to have an immediate effect on the life of the fœtus, since it is born alive; ordinarily, however, death occurs during the first year. The tumor ulcerates, or ruptures, or it may inflame, and the natural result is death.

IX. TUMORS OF VARYING NATURE.

In addition to the tumors mentioned, which are rare enough, there are others which are very exceptional.

Tumors of the neck; general edema of the fœtus (Hohl, Betschler, Osiander, Meissner, Tait, P. Smith, etc.); ankylosis of the fœtus (Busch, Braün, Bird, Becourt, etc.): gibbous fœtuses (Nivert, Montant, Stoltz, Hohl); emphysema of the fœtus, which is rather more common. We have seen two cases. It is the result of *post-mortem* change.

TERATOLOGY.—HERMAPHRODITES.—MONSTROSITIES.

[In order to render this subject as complete as possible, we have borrowed much additional matter from the elaborate description in Tarnier and Budin's *Traité de l'Art des Accouchements.* The subject of teratology is one to which but little space is devoted in the generality of obstetrical treatises, and yet which, from its peculiar interest, deserves somewhat extended reference.—Ed.]

Certain writers have confounded all the anomalies of development under the single name "monstrosities." Bonnet, for instance, says "A monster is an organized production in which the shape, the arrangement or the number of certain of the constituent parts, do not follow ordinary rules."

We believe, however, that the word "monster" should only be used to designate grave developmental anomalies which result in very apparent deformity. An individual with six fingers on one of its hands should not be called a monster. The definition of Geoffroy Saint-Hilaire seems to us preferable to Bonnet's: "Monstrosities present grave anomalies which render difficult, if not impossible, the performance of one or more of the vital functions, or produce in the individual a vicious conformation very different from that which it normally has." Thus we possess the following general classification: *Hemiteric* or half-monsters; *heterotaxic* monsters (where there exists displacement or inversion of the viscera); *hermaphrodites*.

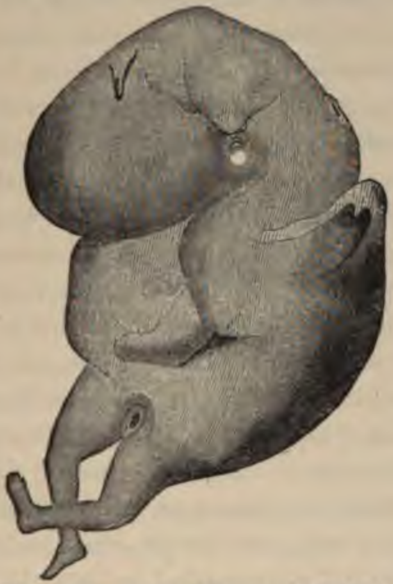


FIG. 182.—EDEMA OF THE FŒTUS. (*Betschler.*)

These constitute simple anomalies in development, and where the anomaly is more complex, the generic term monster is purely applicable.

The following table makes clear the classification:

Anomalies in Development.	Simple,		1. Hemiterics.
	Grave,	Inversion of the viscera.	2. Heterotaxics.
		Genital apparatus.	3. Hermaphrodites.
			4. Monstrosities.

This classification, although extremely artificial, and open to grave objections, is the best which has been proposed.

GENERAL CONSIDERATIONS BEARING ON THE GENESIS OF ANOMALIES.

Before the establishment of embryology on the basis of a science, the grave anomalies in development met with, and the cause of which could not be determined, were attributed to the will of the Almighty. Such in olden time was the established and not so unnatural belief in regard to the legendary Janus, Cyclops, Sirens, Chimeras, Centaurs, etc. This period of fable extended into the middle ages, and it was not until the XVIIth century that teratology began to be studied and to be understood.

The various views in regard to the genesis of animals which have been held since the discovery of the microscope are most curious. For instance, Aromatari believed that the ovum contained the embryo already formed even before it had begun to develop; Swammerdam said that "in nature there is no such thing as generation, but only propagation, growth of parts and exclusion of all chance. Thus may be explained original sin, for all men who have since lived were contained in the beginning in Adam and Eve. When these germs are exhausted, the human race will cease to exist." This doctrine of the pre-existence of germs lasted into the XVIIIth century and was advocated by Malpighi. It was not till the time of Wollf, who showed that primitively the ovule does not contain the embryo, that it was overthrown.

Etienne and Geoffroy Saint-Hilaire, followed later by Dareste, first proved conclusively that all fecundated ovules are identical at the outset, and that some external cause, by interfering with their development, may determine the appearance of anomalies. Dareste in more than 9,000 experiments was able to produce all the types of monstrosities from the eggs of the chick, and thus showed that physical external causes could modify the evolution of the fecundated germ. Whilst then it may be considered as proved that external causes influence the production of monstrosities, it is also true that other factors are powerful in the same direction, and certain ones must, in a measure, act by modifying the male or the female ovule before fecundation. How could we explain, else, those malformations which are hereditary in certain families? We would add that the influence of maternal impressions is very problematical, especially when we remember that exactly similar anomalies have been met with in certain animals in whom there can hardly be question of imagination.

[In reference to this point we would refer to the forthcoming volume (XI.) of the *Trans. Am. Gyn. Society*, where Fordyce Barker maintains, in a paper on "The Influence of Maternal Impressions on the Fœtus," that the weight of authority must be conceded to be in favor of the doctrine that maternal impressions may affect the development, form and character of the fœtus. In the discussion of this paper, Goodell related a remarkable case of the kind. There can be no question, we think, that there must exist some causal relation, although it is one of those hidden mysteries likely ever to remain beyond human ken. Ed.]

The varied causes of anomalies act by producing:

1. Arrest of development; 2. Fusion of organs normally distinct.

Genesis of Anomalies by Arrest of Development. These may be grouped as under:

A. An organ may not be formed at all, there being complete arrest in development. Acephalic fœtuses, absence of uterus or ovaries, etc.

B. An organ before attaining its definitive form stops short in a less advanced developmental phase. Bifid uterus or vagina.

C. Certain organs normally only exist during intra-uterine life. These may persist after birth.

D. Adhesions may form between the embryo and the membranes or between parts of the fœtus itself.

E. Anomalies may [illegible] the nervous system.

Genesis of Anomalies by Fusion. [illegible] fusion of two [illegible] parts [illegible] disappeared, and the [illegible] homologous [illegible] formed.

In the following [illegible] which may affect the [illegible] of the more important [illegible]

Principal Simple Anomalies.

In height.	Dwarfs—diminished growth. Giants—excessive growth.
In volume. . . .	Diminished size of limbs. Faulty development of muscles. " " " mammæ, thymus, etc. Large size of head. Increase of adipose tissue. Excessive size of breasts.
In form	Deformities of the head, etc. " " " stomach, uterus, vagina, pelvis, etc.
In color	Albinism, complete, partial. Melanism, " "
In structure . . .	Abnormal ossification. Cartilaginous state of the bones.
In displacement of the splanchnic organs.	Encephalocele, meningocele, etc. The heart, lungs, etc. Herniæ of the viscera; extrophy of the bladder; late descent of the testicles, etc.
In displacement of the non-splanchnic organs.	Talipes, spinal curvature. The vessels, etc.
In connection . .	Bones, teeth, etc. Abnormal attachment of muscles, etc.
In opening . . .	Vessels of the heart. Vagina, rectum, ureters, urethra.
In perforation . .	Rectum, vulva, urethra, mouth. Œsophagus, eyelids.
In union	Kidneys, testicles, fingers, toes, tongue to palate, etc.
In septum. . . .	Vagina. Uterus.
In persistence or disjunction. . . .	Urachus. Foramen Botali. Hare-lip. Epispadias and hypospadias. Sternal fissures, etc. Spina bifida.
In numerical diminution	Absence of muscular bundles. " " vertebræ. " " fingers, toes. " " kidney. " " uterus, vagina.

In numerical increase.	Supernumerary	tendons, etc.
	"	ribs, teeth, etc.
	"	fingers, etc.
	"	mammæ.

Many of these simple anomalies are treated of at length in treatises on surgery, and therefore we will not describe them here. Of the remainder the essential ones have already been noted by us in other portions of this work. We pass at once to a brief study of heterotaxy, or inversion of the viscera, and to hermaphroditism.

HETEROTAXY.

Heterotaxy includes simple changes in the position of organs, and such changes often occur without real alteration in the relations and connections; in other words they are complex and yet do not at all interfere with the function of the organs. (Saint-Hilaire.) This author recognizes two special divisions: In the one the external form of the individual is preserved, the malformation being limited to the viscera; in the other the entire individual is affected, as well the external as the internal organs. This form is only met with in animals, and not in man, where the two halves of the body are symmetrical. It should not, therefore, detain us.

Inversion of the internal viscera may be total or partial—total when all the abdominal thoracic viscera are affected, partial when only a few.

Total Inversion of the Viscera.—The reported cases are numerous enough. All the viscera are displaced, although retaining their normal connections. Analogically, indeed, "the relation is as the wood-cut to the proof." What is the cause of inversion? In the embryo the majority of the viscera are symmetrical, and if a certain number become later asymmetrical, this may depend on a number of causes. Of the organs which are double in the beginning and situated on each side of the median line, one may disappear and the other persist. If the organ which should atrophy persists, and the one which should persist atrophies, inversion will exist. For instance, hepatic inversion would result if the right lobe should atrophy and the left hypertrophy, these two lobes being considered as remnants of two livers. Again, normally, the digestive tube is single, situated in the mid-line, and its right and left halves are symmetrical. The tube may curve and its dimensions become modified, the stomach forming a right angle with the œsophagus. Thus primitive symmetry would be destroyed.

Partial Inversion of the Viscera.—This variety is rare. It may be limited to the lungs. As instances we note anomalies in distribution of the great vessels at the base of the heart, anomalies in position of the heart.

HERMAPHRODITISM.

In times past, under the term hermaphrodite, were designated individuals who were supposed to possess the organs of generation of both the male and the female, and to be able to perform the functions of the two sexes. It is very questionable if from this standpoint there has ever existed in the human race an individual so constituted anatomically and physiologically.

It is to Saint-Hilaire that we are indebted for a fairly complete study of this subject, defective only because at the time he wrote embryology was as yet in its infancy.

From a developmental point of view we may distinguish in the genital organs three segments. The first includes the external organs, and primitively these are neutral. As growth proceeds, the genital tubercle and folds are differentiated either into clitoris and labia or else into penis and scrotum; the second segment includes the vagina, uterus and tubes in the female, and the epididymis, the vasa deferentia, the seminal vesicles and the ejaculatory ducts in man. The development of this segment differs from that of the preceding in that it does not result from the transformation of a single blastema into male or female organs. Sexal differentiation occurs by the continuous evolution of either Müller's ducts or Wolff's ducts. If the former develop and the latter atrophy a female is formed, and *vice versâ*. At the outset, then, the embryo is bisexal. The third segment is formed by the ovaries in woman, the testicles in man. These organs are formed at the expense of the sexal eminence. The tissue from which the latter is formed contains at the outset both male and female elements. The atrophy of one or another element results in sexal differentiation.

A prime law of development is that the formation of one of two symmetrical organs necessitates that of the other. When a male gland appears the rest of the excretory apparatus must be male, and *vice versâ*.

There may, however, here as elsewhere in the body, result anomalies, and when two glands of opposite sexes are formed, we have hermaphroditism. Thus, in the third segment, a testicle may exist on one side and an ovary on the other, or an ovary and a testicle exist on the same side; in the second segment there may be present on the one side organs formed by Müller's ducts, and on the other organs formed by Wolff's bodies, or on the same side both the ducts and the bodies may have simultaneously developed; in the first segment, similarly, there may exist clitoris and scrotum, or penis and labia. There result, therefore, many varieties of hermaphroditism.

We must distinguish, in the first place, apparent hermaphroditism from the above different varieties. For instance, the testicles may not have descended into the scrotum, and the two halves of the scrotum have remained separate, and we have the external appearance of the female, and yet the individual is a male. If again, the clitoris is hypertrophied, the labia majora fused, the ovaries in the inguinal canal, the individual may be mistaken for a male. These are false hermaphrodites, for they do not possess both male and female organs.

We will consider, in turn, hermaphroditism of the glands and hermaphroditism of the excretory canals and of the external organs of generation.

Hermaphroditism of the Glands.—This variety exists whenever one or more of the glands belonging to different sexes have simultaneously developed. There are three sub-varieties.

1. *Hermaphroditism through bilateral excess* where two ovaries and two testicles exist. Schrell has recorded an instance; between the normal testicles and vasa deferentia there were two ovaries with tubes, one uterus and vagina. The male organs were developed, the female atrophied.

2. *Hermaphroditism by unilateral excess* where there are two ovaries, two tubes, and a rudimentary uterus, a testicle, with vas deferens containing spermatozoa—as in the individual named Hoffmann, who menstruated regularly, and has been described by Rokitansky.

3. *Lateral hermaphroditism without excess*, where there is an ovary on one side and a testicle on the other, has been very frequently observed. In Barkow's case there existed a uterus and tubes, an imperforate vagina passing through a prostate. The external genitals were those of a hypospadiac male. Of the glands, only one testicle was well developed. In

Berthold's case there existed on the right a testicle, an epididymis and a vas deferens opening into a vagina, and on the left side, an ovary, tube, uterus, and a vagina with hymen, opening into the uro-genital sinus.

Hermaphroditism of the Excretory Apparatus.—The following divisions may be made:

A. *Hermaphroditism with two Testicles.*—These instances are very numerous, and we may find the following varieties:

a. There are two testicles, but the external genital organs are female. Such was the case with Madia Arsona, who was during life considered a woman. At the autopsy two atrophied testicles were found, as also vasa deferentia and vesiculæ seminales. The external genital organs were those of a female.

b. In Giraldé's case, there were two labia majora and minora, a vestibule, urinary meatus, a vagina 3½ inches deep. The testicles and vasa deferentia were in the inguinal canal.

c. In Steglehner's case, there were testicles, female external genitals, and in the middle segment both male and female excretory organs.

d. The whole apparatus is male, and superadded, in the middle segment, are female organs. In Petit's case, there were testicles, with epididymis, vasa deferentia, vesiculæ seminales, male external genitals, tubes, uterus, and vagina opening into the urethra.

B. *Hermaphroditism with two Ovaries.*—These instances are not so numerous:

a. The case of Marto Joseph, where the external appearance and personal habits were those of a male, is in point. The external organs were male except that the testicles had not descended. *Post-mortem,* two ovaries, tubes, a uterus and vagina opening into the prostatic portion of the urethra were found.

b. The entire sexual apparatus may be female, and there may be superadded male organs.

In the majority of the recorded cases many of the organs were atrophied. "There existed apparent anatomical wealth by the side of physiological poverty." (Tarnier and Budin.)

[A most singular instance of true hermaphroditism has been recorded by Fowler, of New York, into whose possession had come a cast of the pelvic organs. The individual was aged twenty-seven at the time of his death, which resulted from congestion of the brain during menstruation.

On the cast it was stated: "Was subject to monthly periods, epileptic fits, hysteria, and pains like those of dysmenorrhea. At the autopsy the vagina and male urethra contained a colored fluid like menstrual blood. Was remarkably fine looking and robust, more rotund in limb than is usual in male subjects. The bust and chest were that of a male; the pelvis broad; very light beard. His habits and mode of life were like those of other males in his position in society." The cast was made from the organs themselves which came into the possession of Dr. Sayre, of New York. It represents (Fig. 183) the rectum, pubes, scrotum, penis with prepuce and glans, vagina, uterus, ovaries, tubes and testicles. The individual both menstruated and urinated through the penis, the septum between the bladder and vagina having remained patent.—Ed.]

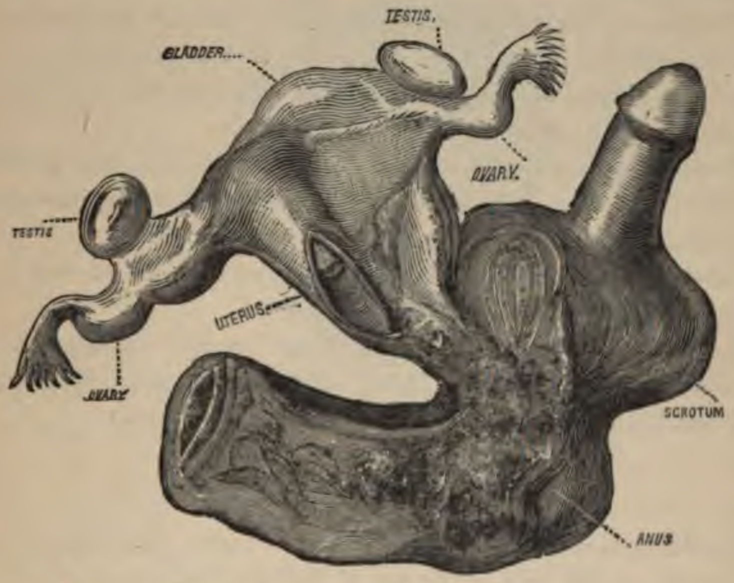


FIG. 183.—ORGANS OF A TRUE HERMAPHRODITE.

MONSTROSITIES.

Monsters, as defined by Saint-Hilaire, are deviations from the specific type, and are very complex in their nature. When they are made up of complete or incomplete elements of a single individual they are called simple; when they are made up of complete or incom ments of more than one individual they constitute composite, double or triple monsters. Saint-Hilaire has divided monsters into two classes, which we will consider in turn.

Simple Monsters.

In case of these monstrosities either there is absence of a portion of the elements of the individual, or else all the elements are present, but they are modified variously in connection and in disposition. Saint-Hilaire has divided the simple monsters into three classes: The *autosites;* the *omphalosites;* the *parasites.*

The autosites may exist outside of the uterus, not that their anomalies in conformation are compatible with long life, but because the cessation of the placental circulation does not mean immediate death.

The omphalosites can only live in the uterus; they die as soon as the placental circulation ceases.

The parasites are of such abnormal and irregular development that they are considered to-day as being simply morbid productions, having their seat in the uterus or ovaries (moles or dermoid cysts.)

Autosites.

The fœtus is composed broadly of limbs, trunk, head and face, and each of these parts may be the seat of monstrosities, which we will consider in turn, following the classification of Saint-Hilaire.

Ectromelic Fœtuses.—These are characterized by the lack of development of one or more of the limbs, which is supposed by Dareste to depend on anomalous development of the amnion. Cases of intrauterine amputation have frequently been confounded with these monstrosities, but there is an essential difference, as is apparent.

According as the lack of development affects one or another limb, ectromelic fœtuses are divided into:

Phocomeles.—Where the atrophy is limited to the middle segments of the limbs, the feet and the hands having continued to develop (Fig. 184);

Hemimeles.—Where the feet or the hands, the forearms or the legs are rudimentary:

Ectromeles.—Where the arrest in development includes all the segments to about an equal degree. (Fig. 185).

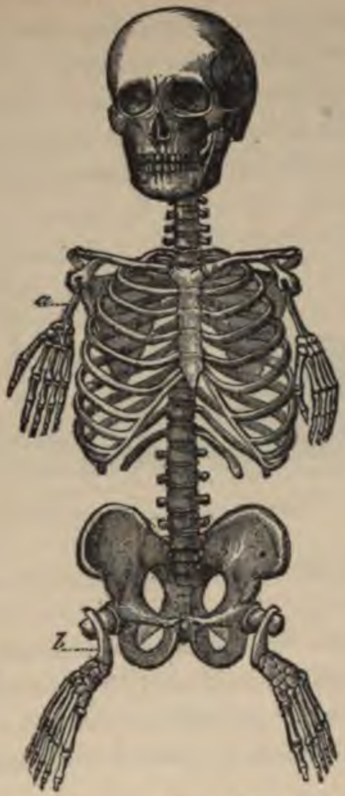


FIG. 184.—PHOCOMELE FŒTUS. (*Museé Dupuytren.*)

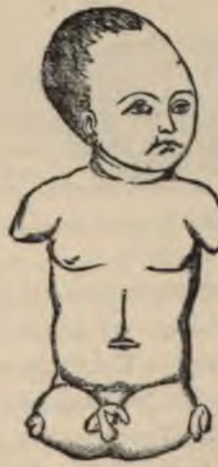


FIG. 185.—ECTROMELE.

Symelic Fœtuses.—These monsters are characterized by the union or median fusion of two limbs of the same kind. The lower limbs may be fused, and by their external surface instead of their internal. According as the fusion is more or less complete, these monsters are divided into:

Symeles.—Where the fusion being more or less complete there exists only a double foot:

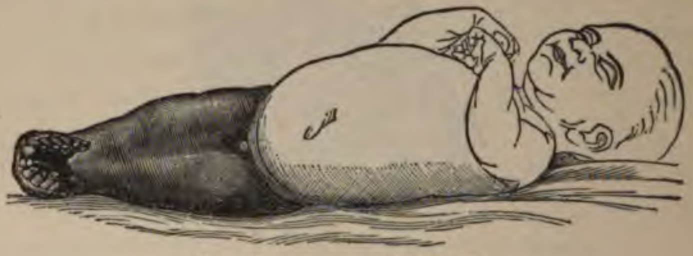


FIG. 186.—SYMELE. Anterior view.

Uromeles.—Where the union is more complete and there exists only a single foot:

Sirenomeles.—Where the fused limbs terminate in a point, the foot being lacking. According to Meckel this variety is only met with in case of female fœtuses, but Saint-Hilaire has met with it in the male.

Celosomic Fœtuses.—These are characterized by a more or less complex eventration of the genito-urinary organs and various viscera. The entire contents of the abdominal cavity may be found in a pouch, the walls of which are formed by the cord. There are usually present in addition anomalies of the limbs, and the sex is usually female. We distinguish, with Saint-Hilaire, cases where the monstrosity is limited to the abdomen, and cases where it extends also to the thorax. The varieties are:

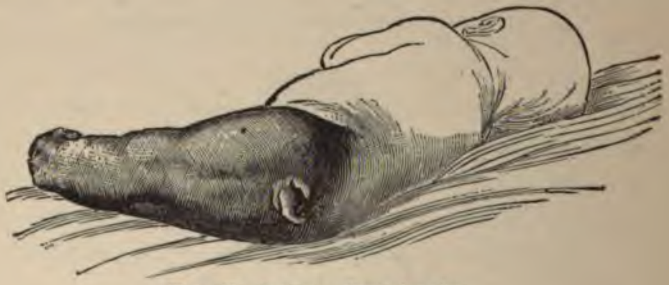


FIG. 187.—SYMELE. Posterior view.

Aspalosomes.—Where there exists lateral or median eventration at the lower part of the abdomen, the urinary, sexual, or intestinal system opening externally by three separate orifices. The situation of these orifices is not normal. The internal genital and urinary organs are atrophied or lacking. Monsters of this variety, born alive, quickly die:

Agenosomes.—Where the organs of generation and urination are lacking or rudimentary. The anus is found in front where the external genitals should be:

Kellosomes.—Where there is lateral eventration at the inferior portion of the abdomen, and absence or lack of development of the pelvic limb of the same side:

Schistosomes.—Lateral or median eventration throughout the entire extent of the abdomen, pelvic limbs lacking or imperfect. The abdominal wall is replaced by a thin membrane through which the viscera may be seen. This variety is very rare:

Pleurosomes.—Where the fissure partially invades the thorax, and where there is atrophy or want of development of the thoracic limb of the same side as the eventration:

Kelosomes.—Lateral or median eventration with fissure, atrophy or entire absence of the sternum, and hernia of the heart. The genito-urinary organs are normal.

Exencephalic Fœtuses.

These constitute a class characterized by the presence of a badly-formed brain, in part external to the skull which is itself imperfect. It is a transition stage, so to speak, between the celosomic and the acephalic monsters. Two varieties exist according as the fissure involves the vertebral column or not, a fissure which must not, however, be confounded with that which is characteristic of spina bifida.

Exencephalic fœtuses without spinal fissure include the notencephalic, proencephalic, podencephalic, hyperencephalic fœtuses of Saint-Hilaire.

Exencephalic fœtuses with spinal fissure include the iniencephalic and the exencephalic fœtuses of the same authority.

Notencephalic Fœtuses.—Where the brain is almost entirely outside of the cranial cavity and posteriorly. The occipital portion of the skull is open, but there is no spinal fissure. At the level of the nucha is found a tumor with a pedicle, reposing on the neck and upper portion of the back, but not adherent. The volume of the tumor depends on the amount of cerebral matter which it contains and the concomitant hydrocephalus.

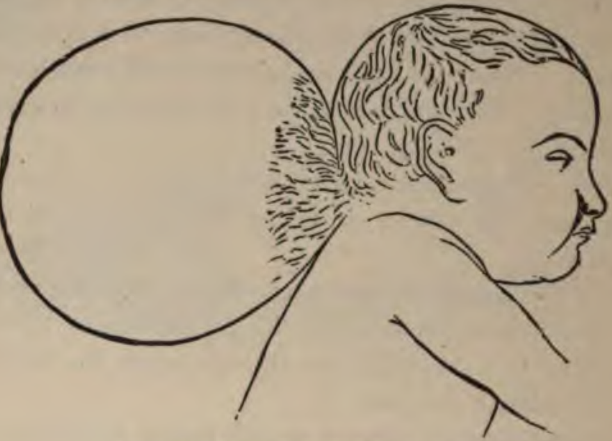


FIG. 188.—NOTENCEPHALIC FŒTUS. (*Bar.*)

The point of exit of the tumor is at the junction of the superior and posterior part of the occipital bone (Fig. 188). These fœtuses usually die in a few days.

Proencephalic Fœtuses.—Where the brain herniates anteriorly through an opening in the frontal bone. It is rarer than the preceding. The monstrosity may exist alone, or be accompanied by deformities of the face, etc. The vault of the skull is flattened.

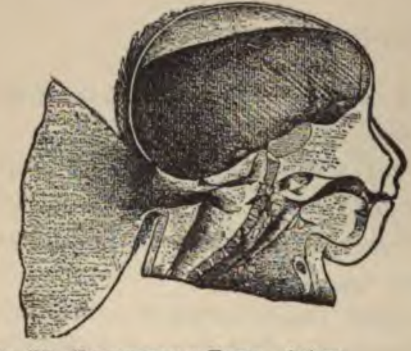


FIG. 189.—NOTENCEPHALIC FŒTUS. Antero-posterior section. (*Bar.*)

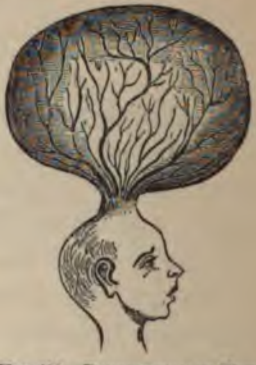


FIG. 190.—PODENCEPHALIC FŒTUS. (*Beneke.*)

Podencephalic Fœtuses.—Where the hernia of the brain is from the vault of the skull (Fig. 190). Ordinarily the tumor is circular, and may involve the sagittal, fronto-parietal sutures, etc.

Hyperencephalic Fœtuses.—Where the upper portion of the skull is almost entirely lacking, the bones of this region existing only as rudimentary pieces. The frontal bones are long narrow shells, the parietal bones are stretched horizontally along the upper border of the temporals. The entire portion of the occipital is rudimentary in its upper part, the basilar apophysis being well developed. It is in reality a highly exaggerated stage of the preceding variety. According to Saint-Hilaire, these fœtuses are nearly always of the male sex, often premature, and are not viable.

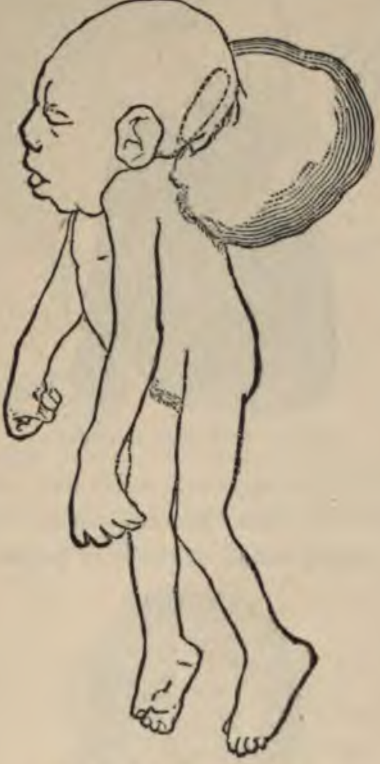


FIG. 191.—INIENCEPHALE. (*Budin.*)

Iniencephalic Fœtuses.—Consist in hernia of the brain at the occipital bone with vertebral fissure. (Fig. 191.) They are really hence notencephalic with fissure of the spine. The vertebral canal is open throughout nearly its whole extent, and the malformation here is nearly if not equally as marked as that in the skull (Fig. 192.)

As Duges says "the head is confounded with the thorax and thrown so far forward that the occiput appears lost between the shoulders." The tumor contracts adhesions with the membranes which cover it. The quantity of cerebral matter outside of the skull varies.

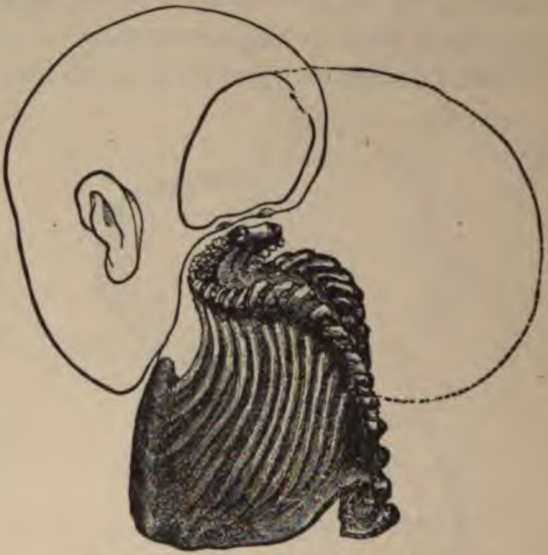


FIG. 192.—INIENCEPHALE. (*Budin.*)

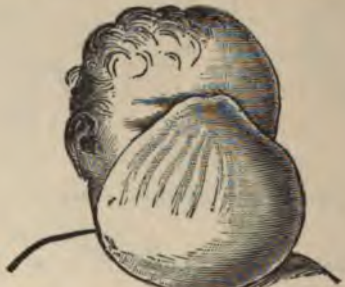


FIG. 193.—EXENCEPHALIC FŒTUS. (*Hildreth.*)

Exencephalic Fœtuses, properly so called, are characterized by the fact that the brain is almost entirely external, and posteriorly associated with spinal fissure. They are similar to the hyperencephalic with the fissure of the vertebral canal superadded. The upper portion of the skull is entirely lacking, whilst in iniencephalic fœtuses there simply exists an opening in the occipital bone. (Fig. 192.) The herniated mass may be so large as to rest upon the back.

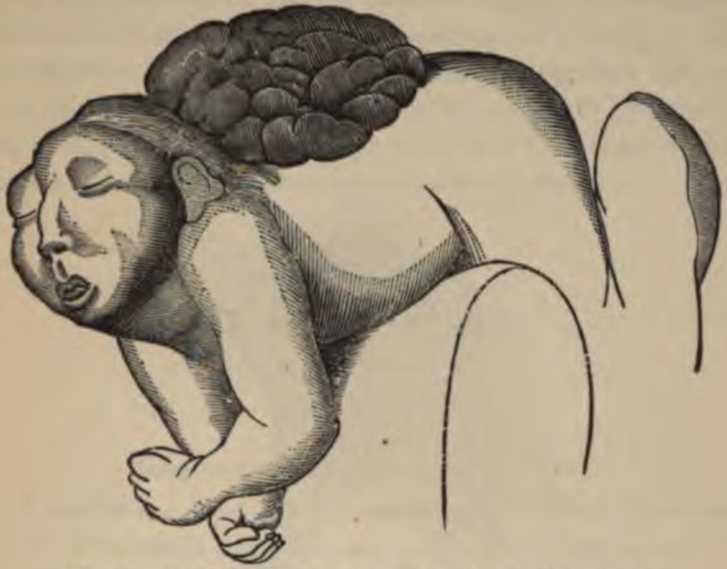


FIG. 194.—HERNIA INVOLVING THE BASE OF THE SKULL. (*Niemeyer.*)

In general, hernia of the brain at the base of the skull is rare. In 93 cases collected by Houel only 9 were of this nature. The seat of the hernia varies. Usually it is at the cribriform plate of the ethmoid; again at the sutures which unite the frontal bone to the nose or the superior maxilla. At times the mass fills both orbits, (Fig. 193). Again the opening

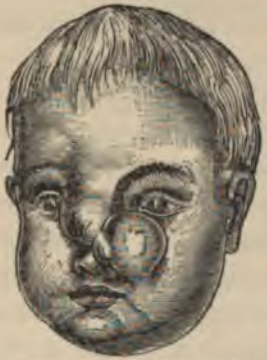


FIG. 195.—HERNIA AT THE BASE OF THE SKULL. (*Clar.*)

is at the sella turcica (Fig. 195.) In a case cited by Ahlfeld and in Virchow's, the tumor had perforated the base of the skull and the palate, and projected through the mouth.

Pseudencephalic Fœtuses.—These fœtuses, according to Saint-Hilaire, do not possess any brain, properly speaking, since the nerve substance has almost entirely disappeared. The vault of the skull is almost entirely lacking. The tumor is deep red in color, and made up of interlacing small vessels filled with blood, and separated by *débris* of brain substance. The mass has a similar texture to erectile tumors. These fœtuses are eminently typical in appearance. "The head has neither forehead nor vertex, is sunk between the shoulders and surmounted by a blood tumor. The face is much developed, directed obliquely, almost always livid. The hair is scanty but long and encircling the tumor. The nose is large and flattened; the mouth usually open; the eyes large and projecting, and at the top of the head; the ears deformed and often hanging down. These monsters have a truly hideous and unnatural appearance." (Saint-Hilaire.)

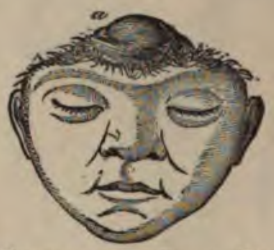


FIG. 196.—PSEUDENCEPHALIC FŒTUS. (*Lancereaux.*)

The vertebral canal is only slightly altered or normal. The spinal marrow exists. These fœtuses are usually of the male sex, and can hardly be considered as able to survive beyond a few hours.

Pseudencephalic fœtuses have been divided into two classes, according as there exists a vertebral fissure or not; *nosencephalic*, where the vascular tumor occupies only the upper part of the head; *thlipsencephalic*, where the anomaly is much more accentuated. The tumor projects so much backwards as to sometimes invade the first cervical vertebræ. It is a frequent monstrosity in the human race, but unknown in animals.

Pseudencephalic fœtuses, properly so-called, may be considered as thlipsencephalic with the vertebral column largely open even down to the lumbar region. The disjointed vertebral bodies are widely separated, the spinal marrow has disappeared, and may not have been replaced by a vascular tumor. The skin of the back along the fissure is lacking, and the external covering is represented by the meningeal membranes.

Anencephalic Fœtuses.—These may be considered as pseudencephalic without the fungous tumor. Other anomalies in development are frequently present. This variety is found almost exclusively in the human species, and usually in the female. According to Meckel, Saint-Hilaire and Dareste, the anomaly is the result of an arrest of development, due to external pressure on the amnion. It may be subdivided into: *Derencephalic* fœtuses, where the vault of the skull is largely open, all the bones having been pushed laterally, in a rudimentary state (Fig. 198); the occipital foramen is not recognizable. The upper cervical vertebræ are included in the arrest of development, as also, at times, the first dorsal.

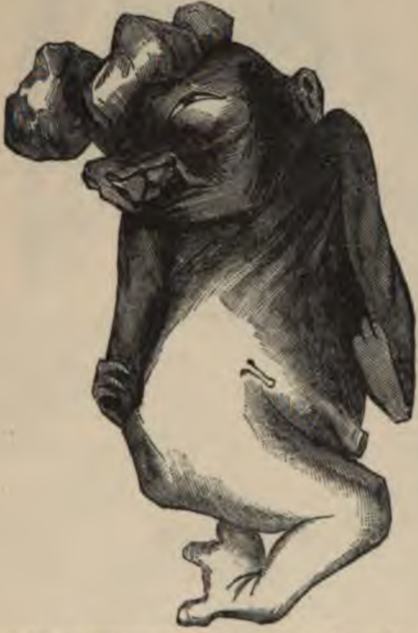


FIG. 197.—PSEUDENCEPHALIC FŒTUS. *(Charpentier.)*

Throughout the fissure the nervous centres are completely lacking. This is a comparatively rare monstrosity.

Anencephalic (true) *Fœtus.*—Where the arrest in development extends throughout the entire vertebral canal, which is open and tr[illegible]rmed into a groove without special depth. The spinal marrow is lacking. Anencephalic fœtuses are distinguished from derencephalic in that the fissure of the vertebral column is much more extensive.

Such fœtuses are often remarkable on account of their development.

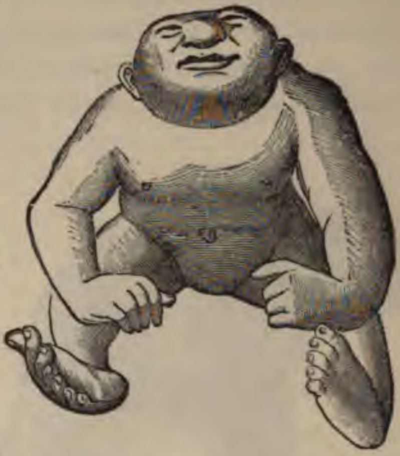


FIG. 198.—DERENCEPHALIC FŒTUS. Front aspect. (*Budin.*)

The liquor amnii is often profuse. The head is small, immediately on top of the trunk, the ears at the level of the shoulders, the face turned forwards, the eyes projecting, the tongue often hanging from the mouth.

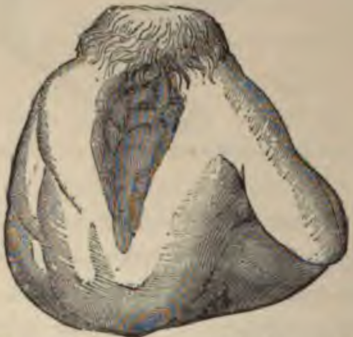


FIG. 199.—DERENCEPHALIC FŒTUS. Posterior aspect. (*Budin.*)

(Fig. 200.) The chief diagnostic point before birth is the fact, to which Cazeaux calls attention, that, whenever the finger touches the presenting part, the fœtus moves convulsively. These movements are probably due to direct excitation of the brain.

"Version is indicated. If it is not possible, the head is pulled down, by a finger or hook in the mouth." (Charpentier.)

Cyclocephalic Fœtuses.—These fœtuses present the following characteristics: "Absence of nasal apparatus which is more or less atrophied; the visual apparatus of one or the other side badly-shaped, at times rudimentary, approaches the median line, one eye almost always being confounded with the other." (Saint-Hilaire.)

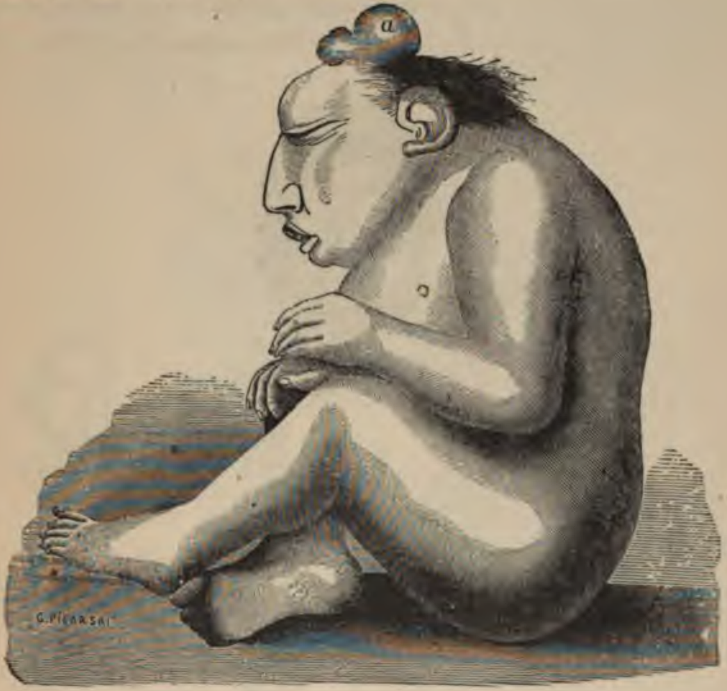


FIG. 200.—ANENCEPHALIC FŒTUS. (*Charpentier.*)—*a*, Remnant of brain.

In the lower grades of these monstrosities, the maxillary region is always much deformed, but the inferior portions of the face are not much altered, and the ears are in their normal site. Cyclocephalicism is often complicated by other anomalies, in the limbs or trunk. The fœtuses are usually female, and are usually born before term. When they are born alive, they soon die, which is the result rather of the difficulty of feeding them than of anomalies in the nervous system. According to Dareste, cyclocephalicism is due to an arrest of development of the anterior cerebral vesicle.

Saint-Hilaire makes a division into five varieties:

Ethnocephalic.—Where the nasal apparatus is not completely atrophied, but is present in a rudimentary state, with two imperfect nostrils, or a single one. There are two orbital cavities and eyes.

Cebocephalic.—Where the nasal apparatus is completely atrophied, but two orbits and eyes are present. They resemble monkeys, whence the name.

Rhinocephalic.—Where the nose has only partially disappeared, the two orbits are fused into one, which occupies the median line. (Figs. 201, 202, 203.) The nose has usually one opening. In the orbit two united distinct eyes may often be seen, although every variety may prevail, from double cornea pupil and lens, down to one large eye, oval, large lens with wide transverse diameter.

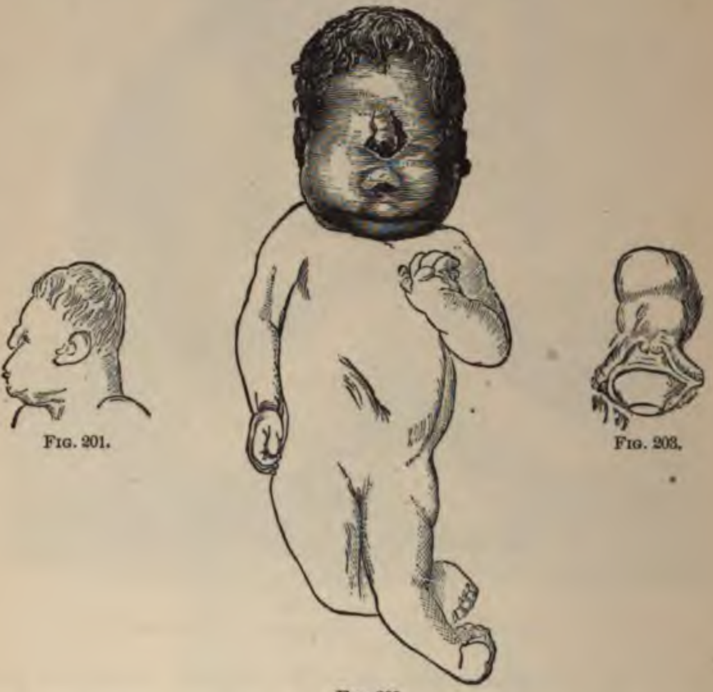


FIG. 201. FIG. 202. FIG. 203.

FIGS. 201, 202 and 203.—RHINOCEPHALIC FŒTUS. (*Budin.*) Fig. 201.—Head in profile. Fig. 202.—Front view. Fig. 203.—The nose is lifted, and the single orbit is shown.

Cyclocephalic (true).—Where the atrophy of the nasal apparatus is more pronounced than in the rhinocephalic fœtus, the nose disappears entirely, and the monster becomes cyclocephalic. (Fig. 204.)

Stomocephalic.—Where the inferior portion of the face is very abnormal. The maxillary bones are lacking, and often the integument projects to such an extent as to look like an elephant's trunk.

Otocephalic Fœtuses.—These are derivatives of the cyclocephalic, but the tendency to atrophy is more marked, since it extends to a greater number of organs. They are characterized in particular by modifications from the side of the aural apparatus, the ears approaching the median line or even united there. Ordinarily there exists as well atrophy more or less marked of the inferior region of the skull, and also absence of the maxillæ, and greater part of the face. The arrest in development having included the ethmoid as well as the inferior portion of the face, the ears are drawn inwards and downwards. The two lateral hemispheres of the brain are fused, imperfectly developed, and surrounded by a large amount of cephalo-rachidian fluid. The eyes may be separated, or united in the same orbit, distinct or fused. In the more advanced degree of monster, the atrophy extends to the complete absence of the organs of vision.

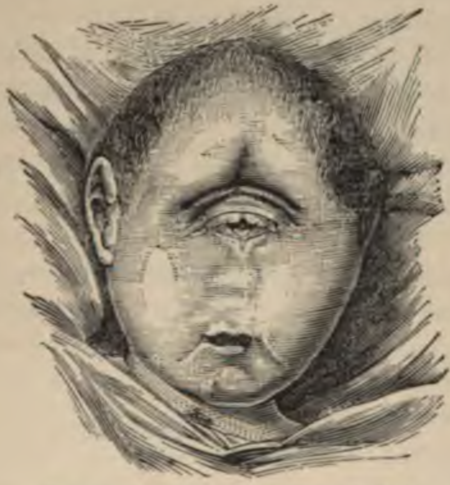


FIG. 204.—CYCLOCEPHALIC FŒTUS. (*Budin.*)

Saint-Hilaire divides the otocephalic fœtuses into five species:

Sphenocephalic.—Where the two eyes are well separated, the two ears are united. The palate bone is bent so that the dental arches touch.

There exists but one auditory meatus. The name of this variety is due to the fact that it resembles the sphenoid bone.

Otocephalic (true).—The nose is atrophied, the eyes fused, the maxillæ imperfect, the ears united or fused.

Edocephalic.—So called because the nasal appendage resembles a penis. In these fœtuses there exists a nose similar to that found in certain cyclocephalic fœtuses. Above it a single eye. Below it a transverse opening which looks like a mouth, but which represents the auditory meati united in the median line. These fœtuses have no mouth, and only rudimentary maxillæ. A single orbit contains the eye or the two eyes. In a very pronounced instance, Tiedmann noted above the eye a snout, and below it the skin hung down like a second snout.

Opocephalic.—Where there exists a single or two eyes in one orbit, two ears near together or united, two atrophied maxillæ, but neither mouth nor nasal appendage. The eye and its appendages form the greater part of the face, whence the name given to the species, which has frequently been found in animals, and only rarely in the human race.

Triocephalic.—Where there is absence of eyes. All the anomalies described in the other varieties may be present. The entire head is only a little spheroidal swelling. This variety is very rare in man if it exists at all, but common enough in animals.

Simple Omphalosite Monsters.

These monsters lack many organs, and, therefore, they die as soon as the cord is cut. They live, in other words, by the umbilicus, whence their name. An interesting point in their history is that they result from a twin pregnancy, where one fœtus is relatively well formed, while the other is a monstrosity, and has a heart very incomplete, even rudimentary. The twins have a single placenta, and, as Meckel and Cazeaux have shown, there exists in this placenta anastomosis between the umbilical arteries and veins of the fœtuses. In the omphalosite embryo the circulation is reversed. It is from the umbilical cord passing from the placenta to the normal fœtus that the funis of the omphalosite is derived. The heart of the normal fœtus sends its blood to the placenta by the umbilical arteries, but a portion of this blood penetrates into the umbilical arteries of the omphalosite. The blood returns from it by the umbilical vein, and passes through the cord of the normal fœtus to the placenta. The circulation of the monster, hence, constitutes a species of diverticulum of the circulation of the normal fœtus. The omphalosite, therefore, receives the blood which contains its nutritive elements, not by the umbilical vein, like the normal fœtus, but by the umbilical artery.

The presence of a fœtus with normal heart is hence essential to the existence of an omphalosite. According to Claudius, gemellarity not only allows the development of the omphalosite during intra-uterine life, but it is the cause of the monstrosity. When two fœtuses, of equal volume, develop simultaneously in the same uterus, each has its own life; but if one of them, well formed at the outset, is feebler than the other, the most vigorous heart will cause the blood pressure in the placenta to become too strong for the weaker. Little by little the heart of the latter will cease to be able to functionate, and the omphalosite is formed. This theory is purely hypothetical. We believe, with Dareste and Saint-Hilaire, that there is actually no proof that gemellarity is the cause of the monstrosity.

Paracephalic Fœtuses.—"These monsters are peculiar in the shape of their bodies, which in almost every respect varies markedly from the normal. Their limbs are imperfect not only in shape, but in the number of fingers. A great part of the thoracic and abdominal viscera may be absent. The head is very imperfect." (Saint-Hilaire.) The characteristic feature, indeed, about this monstrosity is the head, which is simply a mass at the upper part of the trunk. Both skull and the face are implicated in the atrophy. Theoretically this monstrosity constitutes an important link uniting acephalic fœtuses to those which we have just studied. The cervical vertebræ exist, although they may be atrophied so that the head can scarcely be differentiated from the trunk. The limbs are always very imperfect. The diaphragm is sometimes complete, but may be entirely wanting, so that the thoracic and abdominal cavities constitute a single one. The lungs are not present, or are represented only by a few vesicles; the heart may be only rudimentary, the circulatory system is very imperfect. Of all the organs, the genito-urinary are altered the least. The changes in the nervous centres are quite general. Saint-Hilaire says that these monsters have never been observed in animals. In the human race, such monsters have always been expelled in case of a twin pregnancy, where there were two sets of membranes, but only a single placenta. The fœtuses are always of the same sex, usually female.

They are not viable, and in no case have they ever given sign of life. Subvarieties are: *Omocephalic,* where the arrest of development is a trifle more accentuated. The thoracic limbs are lacking. *Hemicephalic,* where the head is still more imperfect. There is no mouth, the organs of sense are no longer distinct. A median superior mass is the only external trace of skull.

Acephalic Fœtuses.—These are distinguished from the paracephalic by the complete atrophy of the head, of which there exist only traces appreciable anatomically. The organs of sense are not even formed. There is scarcely any projection above the trunk, which might be taken for a head. The upper extremity of the trunk is covered by a smooth skin like that of the rest of the body. The shape of the trunk is also abnormal. Its form is irregular and imperfectly symmetrical. The thoracic and abdominal viscera are badly formed or even absent. The thoracic viscera are particularly affected, the heart being lacking, or else only traces of the organ. Extra-uterine life is hence not possible. The genito-urinary apparatus is relatively developed.

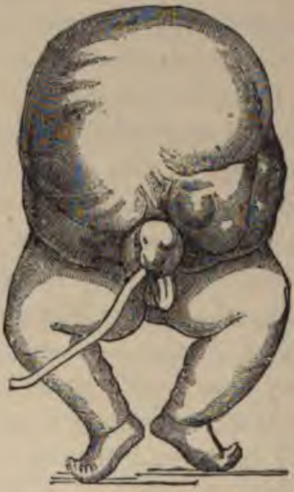


FIG. 205.—ACEPHALIC FŒTUS.

These monsters are likewise usually expelled after a twin pregnancy, the placenta being common to the twins. The fœtuses are of the same sex, sometimes hermaphrodites. Often it is not possible to recognize the sex of the monster.

Anidic Fœtuses.—The form of these monsters is as abnormal as possible without being indeterminate. It is ovoid, globular, pyriform. The term acardiac has been applied to them, but it is defective, for, although certain of them have no heart, in the higher degrees vestiges of this organ are found. These monsters, however, have no circulatory system, properly so-called. The true heart is not in the monster, but in its brother, whose heart really works for both. The life of the monster ceases, hence, as soon as it is separated from its twin brother. It is a true parasite in intra-uterine life, and is not viable externally.

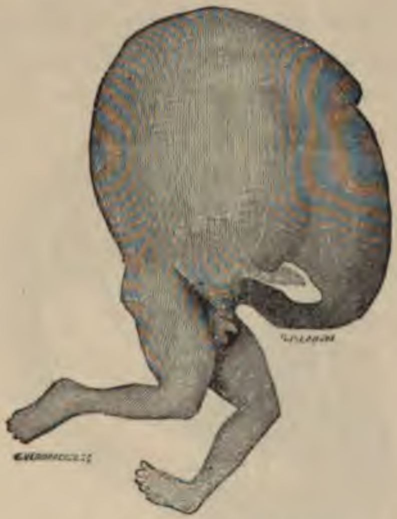


FIG. 206.—ACARDIAC. (*Poppel.*)

Acardiacs then may be defined as the outcome of a twin pregnancy, where the fœtuses are enclosed in a single amnion, and there is anastomosis of the two vascular systems. Now in one fœtus the blood pressure becomes exaggerated and diminished in the other. One fœtus developes normally, therefore, and the other atrophies. The stasis in the umbilical vein causes edema and hypertrophy of the subcutaneous cellular tissue.

Spiegelberg and Ahlfeld describe four varieties of acardiacs: 1. *Amorphi* or *mylacephali.*—Spheroidal, covered with skin, without head or extremities. Inside the mass are found a few rudimentary vertebræ, muscles, rudiments of the intestine. 2. *Acornu.*—Badly-shaped head, and very rudimentary trunk. The cord is attached at the neck. 3. *Acephali.*—

There exists no head. 4. *Acardiaci anceps.*—The head, body, pelvis, limbs, exist, as well as the heart, but these organs are atrophied.

Dystocia in Twin Pregnancy.

In twin pregnancy, dystocia may occur under two very different circumstances: The twins are separate and well formed. The twins are more or less fused together.

I. Isolated Twins.

In 1877, Besson divided the causes into predisposing and determining. Among the first he noted: Excessive size of the pelvis, a single sac, small fœtuses and faulty accommodation. Among the second, spasmodic and tetanic contraction of the uterus, the projection of the sac containing the superior fœtus below the first presenting fœtus, the premature rupture of the membranes of the second fœtus.

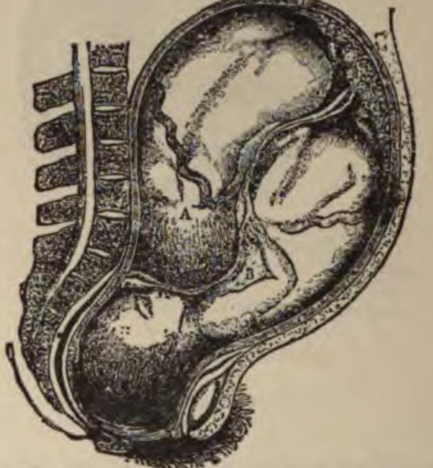


Fig. 207.—Twins Presenting by the Vertex.

a. *The Fœtuses present by the Vertex.* (Fig. 207.)—Usually the heads present successively at the superior strait, and there is no difficulty. Sometimes, however, the head of the second fœtus is placed on the neck of the first, presenting together in the excavation. If the fœtuses are small they may be expelled spontaneously, but otherwise intervention is necessary.

b. *One Fœtus presents by the Breech, the other by the Head.* (Fig. 208).—In case the legs are extended, the head of the second child may engage at the same time as the extremity of the first. The head of the first may hook on to that of the second child, and drag it down. Delivery is only possible where the fœtuses are small, and the uterine contractions strong and sustained. In certain instances, it has been possible to push up the head of the second child, and thus to deliver that of the first. (Cases of Budin (Fig. 208), Perrochaud, Sidney, Calise, Walter.) The forceps has been used by Hohl, Carrière, Balfour, Tellkampf, Eichorn, Braün, Genth, Depaul, and others. Craniotomy and decapitation have been practised by numerous others.

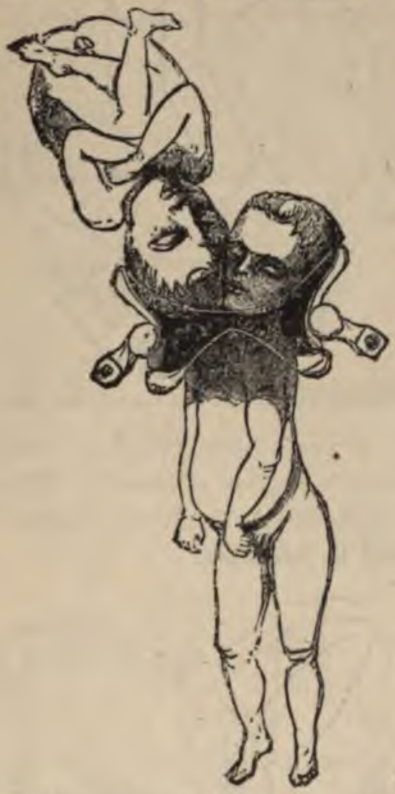


FIG. 208.—PRESENTATION OF PELVIC EXTREMITY OF ONE FŒTUS, AND OF HEAD OF THE OTHER.

c. *The first Infant presents by the Head, the second by the Breech.*—A case has been recorded by Mauriceau, where the sac of the second infant projected below the head of the first, and constituted the obstacle.

d. *The Twins present by the Breech.*—If the breeches are complete they cannot engage simultaneously; if the legs are extended the feet may descend together. (Cases of Amand, of Schultze, of Plessmann.)

e. *The first Fœtus presents by the Head, the second by the Trunk.*—Two cases have been reported: One of Morgagni (Fig. 209), one of Solayres.

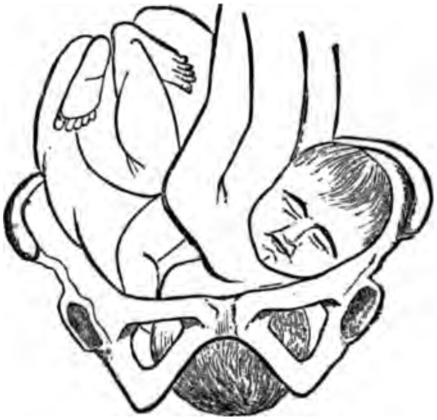


FIG. 209.—ONE FŒTUS PRESENTING BY THE VERTEX, THE OTHER BY THE TRUNK.

f. *The first Fœtus presents by the Breech, the second by the Trunk.*—One case of Baudelocque's, another of Dunal's. (Fig. 210.)

g. *The first Fœtus presents by the Trunk, the other by the Breech.*—A case has been recorded by Bartscher.

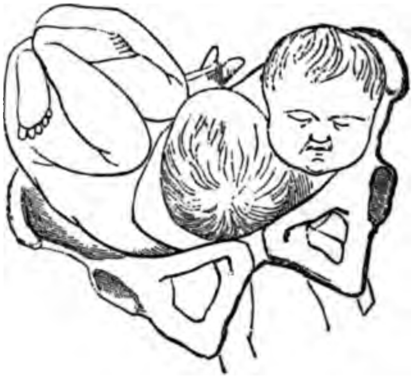


FIG. 210.—ONE FŒTUS PRESENTING BY THE BREECH, THE OTHER BY THE TRUNK.

The above are the cases found in literature by Besson. In the majority the diagnosis was not made till labor. It is difficult to lay down rules for treatment. One rule should be absolute, and this is to abstain from the administration of ergot, which can only compromise the life of the fœtus, and complicate the necessary intervention.

In the exceptional cases, where the twins occupy the same amniotic sac, the cords may intertwine and knot. Muller has collected eight cases, and to these we would add those of Ygonin, Fricker, Kleinwachter and Guéniot.

Composite Monsters (*Autosites*).

Autosite composite monsters include: Ensomphalic, monomphalic, sycephalic, monocephalic, sysomic, monosomic fœtuses.

Ensomphalic Fœtuses.—"These fœtuses are each practically complete, although united together, and are able to accomplish independently almost all the vital functions. Each has its own umbilicus, and, during intra-uterine life, its umbilical cord." (Saint-Hilaire.) Each is normally constituted, except at the point of fusion; they are viable, and if they usually die, it is because they are born before term, or there is some

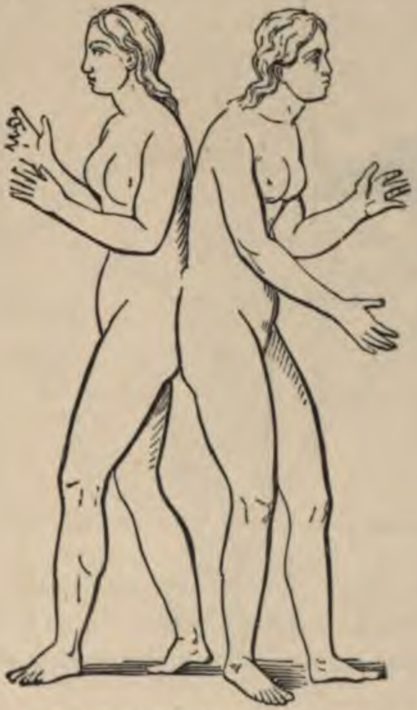


FIG. 211.—PYGOPAGI. (*Charpentier.*)

difficulty during delivery. They may be distinguished into: Pygopagi, metopagi, and cephalopagi.

Pygopagi.—Where the fusion is back to back. The sacrums are united from the first or the second sacral vertebra. The rectum is double above, and single below. They are viable, and a number have reached the adult age. (Helène Judith, Millie-Christine.) The union of the sacrums is the reason why there has always been hesitancy in separating the two individuals. In one case where this was attempted, they quickly died.

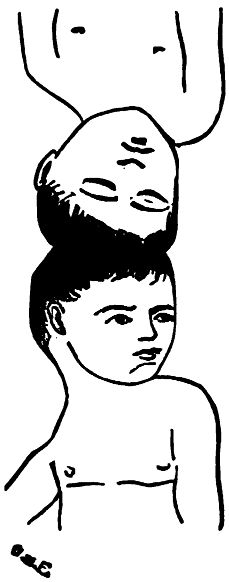


FIG. 212.—METOPAGI. (*Charpentier.*)

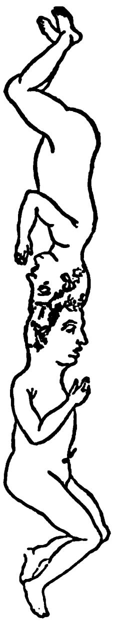


FIG. 213.—CEPHALOPAGI. (*De Baer.*)

Metopagi.—Where union is by the cephalic extremity, forehead to forehead, vertex to vertex. They are normal except at the point of union. (Fig. 212.) The anterior and the posterior portions of the fœtuses are in the same planes.

Cephalopagi.—Are united also by the heads, but they look in opposite directions. (Fig. 213.)

In the above two varieties, union of the fœtuses may be by an extensive surface, or else by pedicle. In the first instance, the fœtuses are end to end; in the second the two bodies may be more or less inclined one to the other, or even be parallel. We would add, further, that there exist transitional stages between the metopagi and the cephalopagi, where the anterior plane of one fœtus is continuous with the lateral plane of the other.

Monomphalic Fœtuses.—These are characterized by the union of two complete individuals at a common umbilicus. Very few ever reach adult age.

If the union is below the umbilicus, we have an ischiopage, if above the umbilicus a xyphopage, sternopage, ectopage, hemipage.

Ischiopage.—Where two individuals are fused together at the umbilicus face to face. The bones of the pelvis of one fœtus, instead of meeting in the median line, are separated to the right and the left to join those of the other fœtus. We thus find two lateral pubic joints. The external genital organs are similarly arranged, the right of one fœtus being united to the left of the other, and *vice versâ.* In addition, other anomalies may be noted bearing on other organs, such as extrophy of the bladder, or more or less intimate union of limbs.

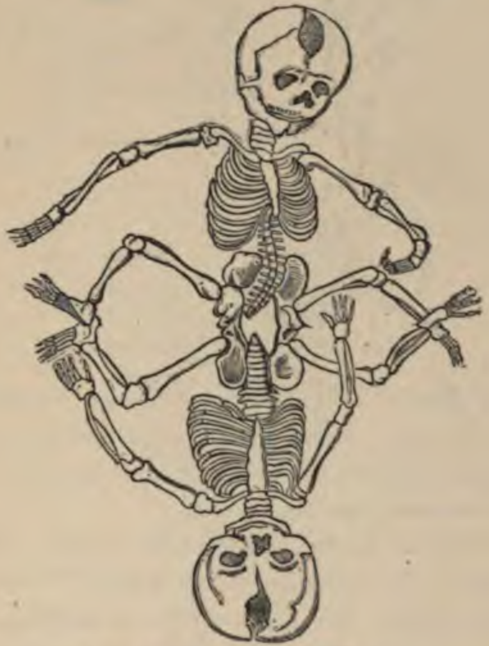


FIG. 214.—ISCHIOPAGE. (*Prochaska.*)

Xyphopage.—Where the union of the individuals is above the umbilicus, that is to say, begins there and extends above to include a portion of the thorax. (Fig. 216.) The fusion of the individuals is more or less deep, in certain instances only by the skin; in others the livers unite into one vast hepatic gland. There may be two hearts contained in two pericardial sacs, or in one. The two diaphragms may be continuous, forming a single septum between the abdominal and thoracic cavities.

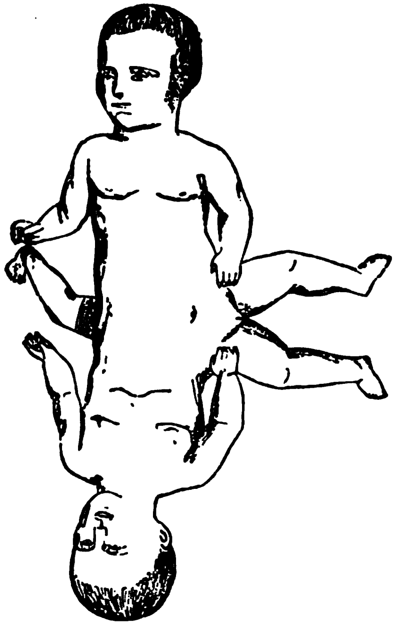


FIG. 215.—ISCHIOPAGE. (*Charpentier.*)

Xyphopages are rarer than ischiopages.

Sternopage.—Where the two individuals are fused, face to face, from the umbilicus to the upper portion of the thorax. They are very similar to the preceding variety. The union of the two sternums is analogous to that of the pelves in case of the ischiopage. Each sternum is divided in the mid-line, and each half with its ribs opens outwardly like the leaves of a book. There is a single thoracic cavity, two vertebral columns, two sterno-costal walls, each wall being formed by half the sternum and ribs of one fœtus, and half of the other. There is a single pericardial sac, containing two hearts near together or united. The large vessels of the heart are anomalous, the diaphragms are united, forming a single septum with two symmetrical halves. The lungs are four in number, and but little altered.

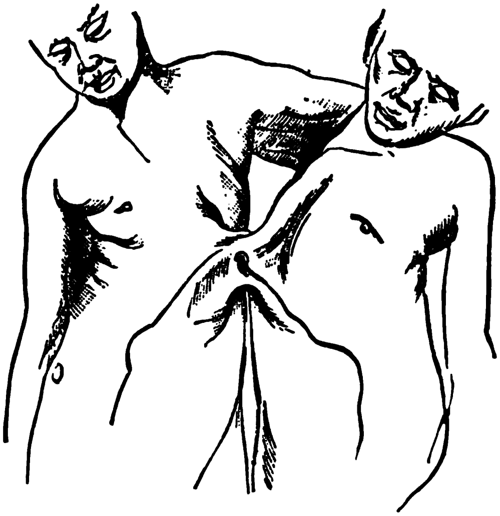


FIG. 216.—XIPHOPAGE. (*Pancoast.*) The Siamese Twins.

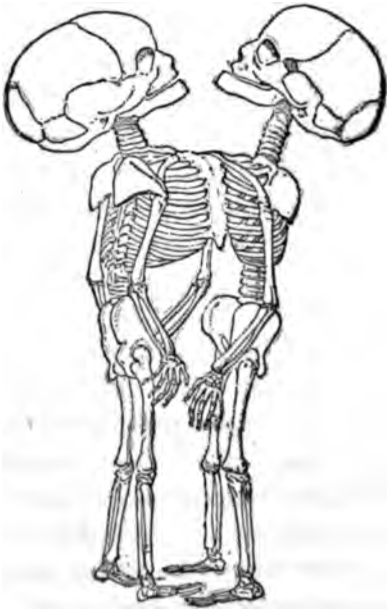


FIG. 217.—STERNOPAGE. (*Budin.*)

This monstrosity is not rare. They die shortly after birth, owing likely enough to anomalies in the hearts and great vessels.

Ectopage.—Characterized by inequality of the thoracic walls, or rather of the two costo-sternal walls of the double thorax, one well developed, the other more or less imperfect. The degree of atrophy of one thorax is variable. The vertebral columns are near together. The arms belonging to the atrophied side are near together, sometimes fused. The monster may have three or more arms. It has four lungs, but the two on the atrophied side are very small. There are two hearts situated above a

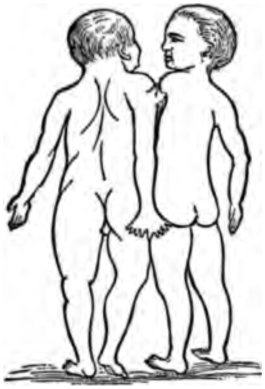


FIG. 218.—ECTOPAGE. (*Regnauld.*)

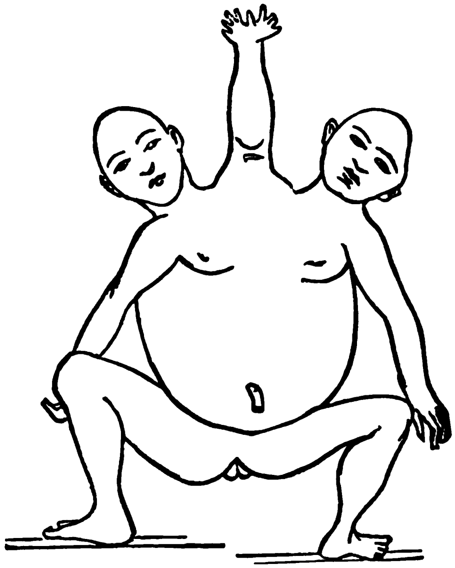


FIG. 219—ECTOPAGE. (*Charpentier.*)

large diaphragm. The liver is often single, as also the stomach. Death has followed immediately after birth in all the known cases.

Hemipage.—Is a very rare monstrosity. We find two bodies fused at the thorax, with two very unequal thoracic walls, half of which belongs to each individual. There is this essential difference from the ectopage—the fusion extends even to the mouths, which form a single cavity. (Fig. 221.) In other words, the two faces and the two necks are joined

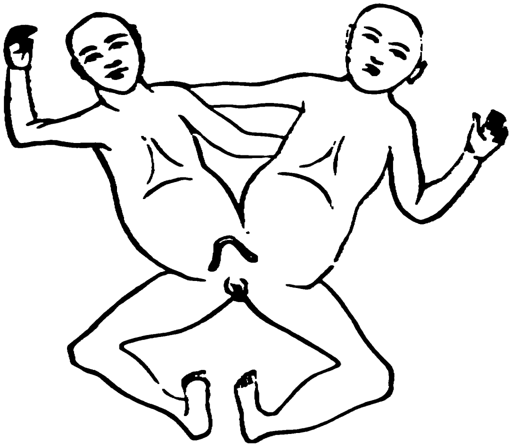


FIG. 220.—ECTOPAGE. (*Charpentier.*)

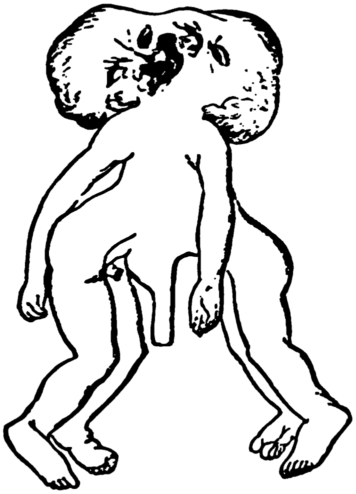


FIG. 221.—HEMIPAGE. (*Hartung.*)

anteriorly and obliquely, the upper part of the faces and skulls being distinct.

Sycephalic Fœtuses.—Here there is no longer simply junction of the two heads, but intimate fusion. These monsters have been described under the various terms, *janicephalic, janiformic,* and have bodies completely separated below the umbilicus, and fused above. There is a single head, with two faces, the one opposed to the other. "The two faces of janiform monsters are made up exactly as are the two pelves or thoraces of ischiopages and sternopages. The right half of the head of each fœtus is separated from the left half, and the two half heads are disjointed, one from the other laterally, even as the leaves of a book may be divided, the back of the book not being displaced. The right half-face of one individual corresponds to that of the other, and unites with it, and inversely, and so there are formed two faces which are lateral. Thus there exists on each side of the head a face, one half of which belongs to one individual, and the other half to the other, and which still, in size, may be scarcely beyond the normal.

In these monsters all the anomalies may be formed which have been noted under the sternopagic fœtuses. There are, however, two mouths, two pharynges, one of which may end in a *cul-de-sac.* Each fœtus has its spinal cord, and the same is true of the medulla and the cerebral hemispheres, which are not fused, the two brains often being separated by a strong septum. These monsters are born at term, and are always unisexal. The varieties are:

Janiceps.—One large head with two complete faces, or nearly so, diametrically opposed, one large thorax with two sternal surfaces, one neck larger still than the double head and thorax which it separates, one umbilicus, below which the bodies are separated, two vertebral columns, two occiputs, eight normal limbs. Rarely there have been observed the anomalies belonging to the symelic, rhinocephalic, anencephalic fœtuses.

Miopes.—Where one face is normal, while the other does not really exist, but is represented by two ears very near one another, or perhaps only one median ear, and above it one orbit and an eye, more or less imperfect. Each face looks outwards, and each occiput inwards. This monstrosity is exceedingly rare.

Synotes.—The monstrosity is still more accentuated. The eye has disappeared, and on the atrophied side only the ears are found close together or fused, often only the meatuses. This variety is relatively rare in man, but frequent in animals.

Monocephalic Fœtuses.—These include all the composite autosites in whom a double head without external trace of junction surmounts two bodies joined in a more or less intimate manner, and more or less extensively. (Saint-Hilaire.)

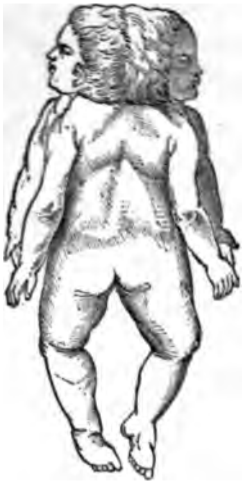


FIG. 222.—JANICEPS. (*Bordenave.*) In this case the lower limbs were anomalous.

Monocephalic fœtuses present two characteristics: "The first, apparent unity of the head, and secondly fusion of two bodies." (Saint-Hilaire.) When the bodies are separated below the umbilicus and united above, we have the varieties *deradelphe* and *thoradelphe*; when the bodies are united also below the umbilicus, we have the *ileadelphe* and *synadelphe*.

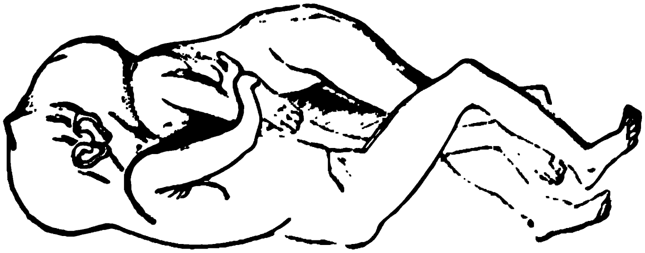
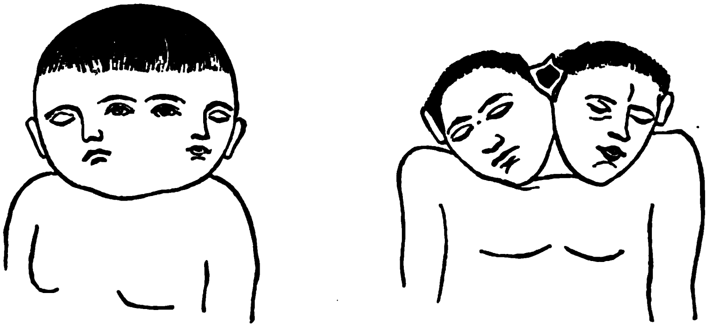


FIG. 223.—SYNOTE. (*Meckel.*)

These monsters are very rare in the human race. Saint-Hilaire was able to find but two instances, and not a single instance in man of thoradelphic or synadelphic fœtus.

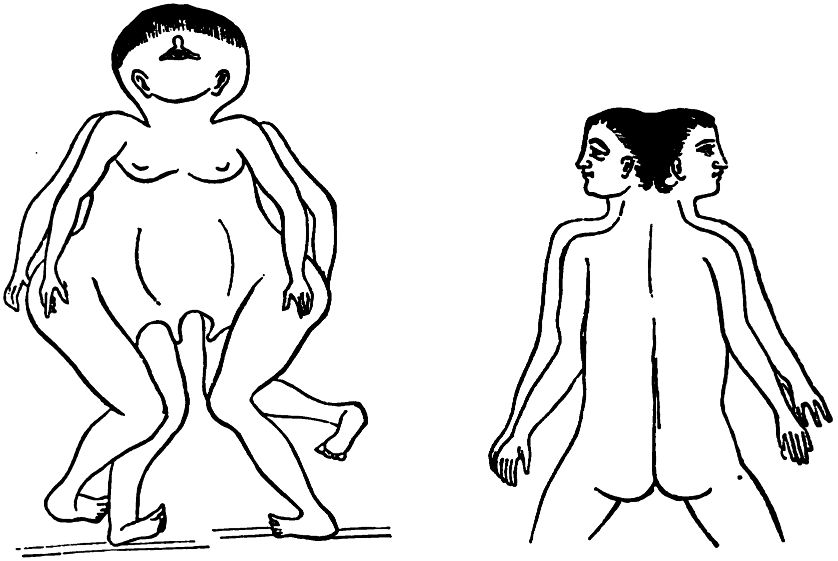
Deradelphe.—Where the bodies are separated below the umbilicus, and united above. Four pelvic limbs, three or four thoracic limbs, a single head.



FIGS. 224 and 225.—DIPROSOPE. (*Charpentier.*)

Thoradelphe.—Where the bodies are united above the umbilicus and separated below. Four pelvic limbs and only two thoracic; one head.

Ileadelphe.—One head, one neck, two thoracic limbs, one body below the umbilicus, bifurcating at the pelvis where there are four limbs.



FIGS. 226 and 227.—CEPHALO-THORACOPAGI. (*Charpentier.*)

Synadelphe.—One head, a single body including the pelvis, but there are eight limbs, four dorsal and superior.

The above figures represent varieties of preceding groups.

Sysomic Fœtuses.—These are characterized by the more or less complete fusion of the two trunks, the two heads remaining distinct and separate. According to the degree of fusion, they are known as psodymes, xyphodymes, derodymes.

Psodymes.—Where there is a single pelvis with two lower limbs. The lower part of the abdominal cavity is single, as also the contained viscera. Above, the trunk seems to bifurcate, so that there are two thoraces, each having two arms. The vertebral column is single below, in the lumbar region, and bifurcates at the dorsal. Sometimes a third rudimentary lower limb is seen, adherent by ligaments to the vertebral column. These monsters are very rare, and some have lived.

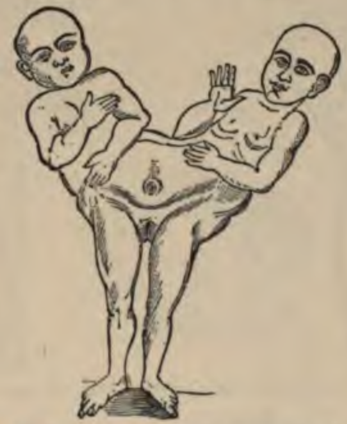
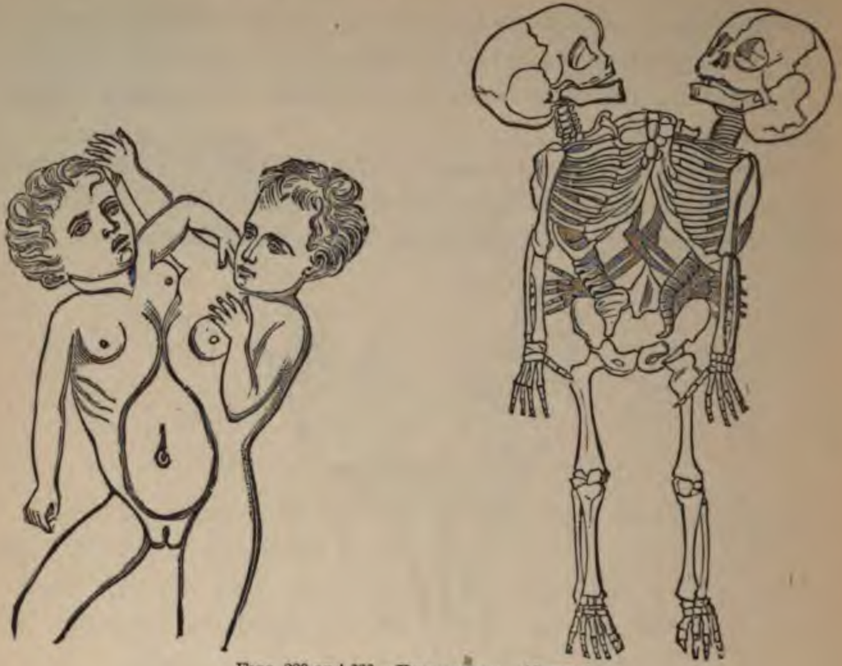


FIG. 228.—PSODYMES. (*Andreas Emmenius.*)

Xyphodymes.—Where the fusion invades the lower part of the thoracic walls. There are two thoraces separated above, but not below. (Fig. 229.) "The vertebral columns, in certain cases at least, are entirely separate, and between them is a rudimentary pelvis usually formed of a single piece. There are two normal lower limbs. The two coxal bones are widely separated posteriorly, and between them are the sacrum and the two spinal columns. When a third rudimentary limb exists, it is attached to the centre, in front." (Saint-Hilaire.) Throughout the united thoraces exists the same mechanism as in the sternopages. A few examples of xyphodymes have been seen in the human race. They may live, and the most celebrated case is that of Ritta-Christina, on whom Serres made an autopsy. (Fig. 229.)



FIGS. 229 and 230.—XYPHODYMES. (*Serres.*)

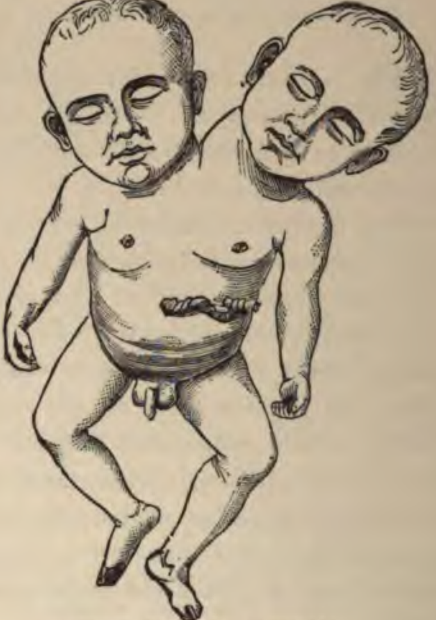


FIG. 231—DERODYME. (*Ahlfeld.*)

Derodymes.—Where the body is fused throughout its entire length, although there are traces externally of union. The limbs may be normal in number, although there may exist certain rudimentary buds. At the neck the body divides into two heads. (Fig. 231.)

They differ only from the xyphodymes in that the vertebral columns are near together and parallel. From their external borders extend the ribs, which are inserted in front into a wide sternum, while from the internal borders extend small short ribs, which unite in the median line.

Monosomic Fœtuses.—These are distinguished from those which we have studied, in that there is still more complete fusion of the bodies. There is in reality a single body surmounted by two heads. The varieties are:

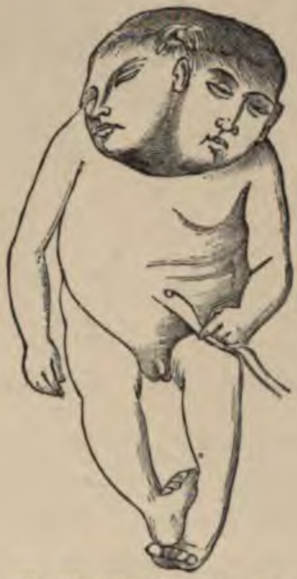


FIG. 232.—MIODYMES. (*Depaul.*)

Atlodymes.—Where there are two heads on a common body, but this body has really a truly single organization. Not a single example was found by Saint-Hilaire in the human species.

Miodymes.—Where the two heads are not only contiguous, but are united laterally by the occiputs. (Fig. 232.) There may be four ears or two, or even three. The neck is sometimes partially divided.

Opodymes.—Where the fusion is still more accentuated. The ocular regions are near together, and there may be two eyes in two more or less distinct orbits, two eyes in a single orbit, one orbit containing a single eye, often imperfect. (Fig. 233.) The middle parts present the anomalies which are found in case of the Cyclops. The mouths may be near together or separated; they may even form a single cavity. Whatever the disposition of the mouths, there is always fusion of the posterior part, and while anteriorly the tongue is double, it is always single posteriorly.

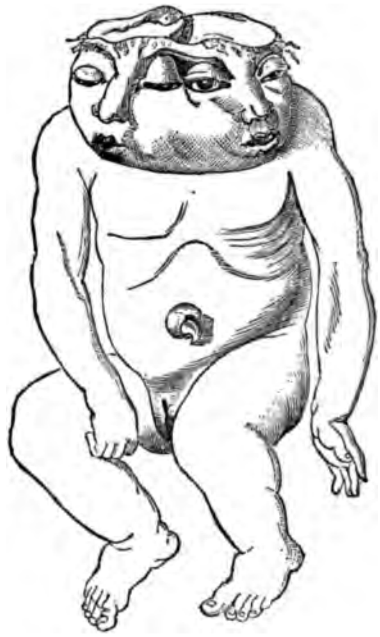


FIG. 233.—OPODYME. (*Sammering.*)

In the opodymes, anencephalus or microcephalus often coexist, and usually in both heads.

Complex Parasite Monstrosities.

In the case of all the monsters we have so far studied, the two individuals, who by their union constitute the double monster, had about an equal volume. In those we are going to consider there is fusion of two beings, one of whom has undergone such arrest in development that it could not live independently of the other.

Heteropage.—These are characterized by the presence of a parasite suspended to the anterior abdominal wall of the principal subject. There are two distinct sets of limbs and one head. This monstrosity is very rare. (Fig. 234.)

Heteradelph.—If the parasite's head is lacking, so that the body, with or without the thoracic limbs, seems to implant itself by its upper portion at the level of the epigastrium of the autosite, we call it a heteradelph. (Fig. 235.) It is the least rare variety in the human species.

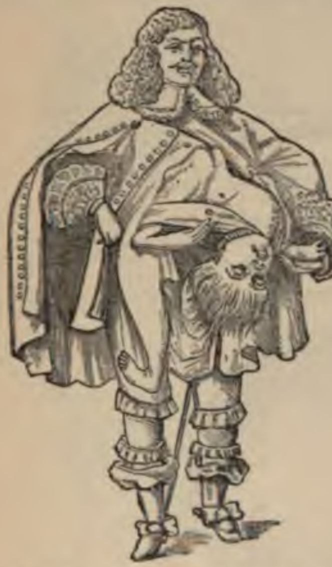


FIG. 234.—HETEROPAGES. (*Licetus.*)

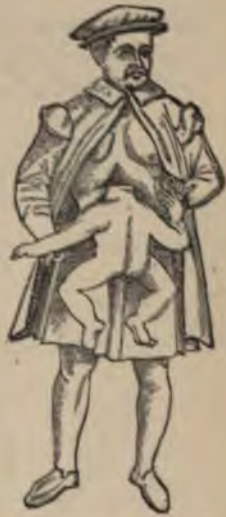


FIG. 235.—HETERADELPH. (*Bruckmann.*)

Heterodyne.—The parasite is represented only by a more or less imperfect head implanted, by a very rudimentary neck and thorax, on the anterior surface of the autosite.

Heterotype.—This form, although named by Saint-Hilaire, was never described by him.

Heteromorph.—The same remark applies to this as to the preceding.

Heteralicus.—The parasite is inserted at a distance from the umbilicus of the autosite. It is constituted by a head implanted on that of the principal subject. There may be only a head, or vestiges of a trunk. The face of the parasite is usually turned towards the right lateral plane of the autosite. The epicome, which belongs in this class, may live a number of years. Saint-Hilaire speaks of one which lived over four years. This monstrosity is very rare.

Polignathi.—These are very singular monsters. "If we imagine, attached and as though suspended from one of the maxillæ of an otherwise regular being, deformed maxillæ, or even a very irregular mass of amorphous bone and cartilage, in which it is difficult to recognize the traces of a head, although the mass is covered with integument, partly cutaneous and partly mucous, then we will have an idea of the curious modifications which characterize a polygnathic monster." (Saint-Hilaire.)

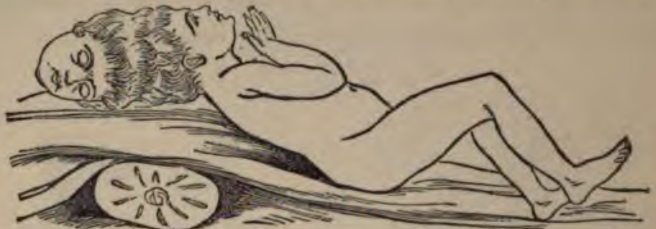


FIG. 236.—EPICOME. (*De Baer.*)

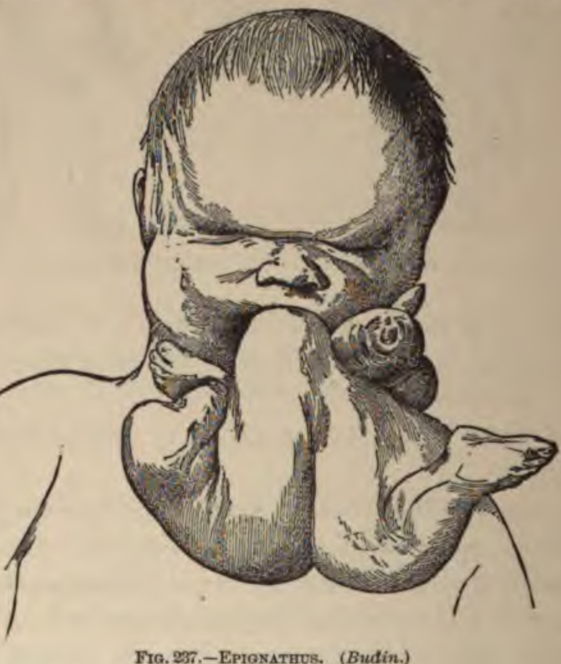


FIG. 237.—EPIGNATHUS. (*Budin.*)

The varieties are:

Epignathus.—Where the parasite is inserted on the superior maxilla, usually on the palatine apophysis. (Fig. 237.)

Hypognathus.—Where the parasite is implanted on the inferior maxilla.

Augnathus.—Very similar to the preceding, where the head of the parasite is so imperfect, that it is really simply a rudimentary maxilla, implanted on the inferior maxilla of the autosite.

Polymelic Fœtuses.—These are double monsters, where the parasite is reduced to one or two limbs, directly inserted on the autosite, and through the agency of a mass which represents the remaining part of the trunk.

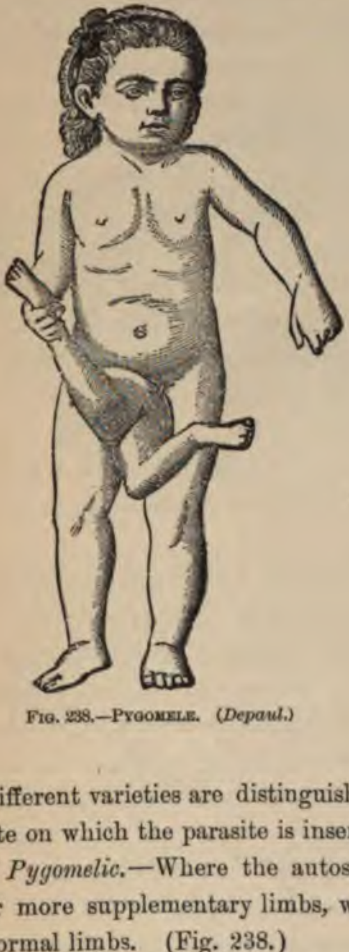


FIG. 238.—PYGOMELE. (*Depaul.*)

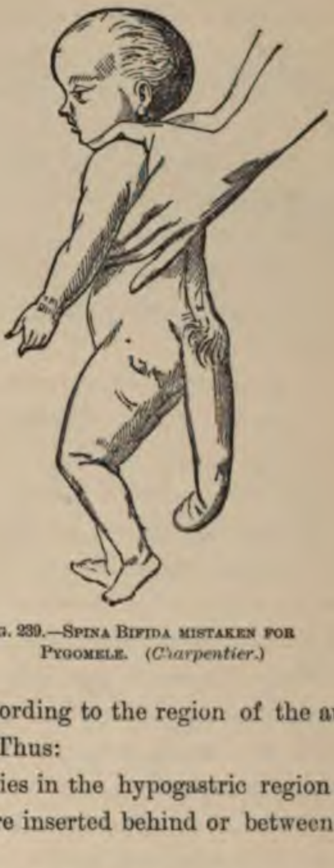


FIG. 239.—SPINA BIFIDA MISTAKEN FOR PYGOMELE. (*Charpentier.*)

Different varieties are distinguished according to the region of the autosite on which the parasite is inserted. Thus:

Pygomelic.—Where the autosite carries in the hypogastric region one or more supplementary limbs, which are inserted behind or between the normal limbs. (Fig. 238.)

Ordinarily, the accessory limbs are inserted on a pelvis the bones of which articulate with those of the pelvis of the autosite, even as the pelvic bones articulate in the pygopage. The accessory limbs are always more or less atrophied. The malformations of which they are the seat are most accentuated in the feet. If the accessory pelvis is atrophied it may close all connection with that of the autosite. In a more advanced degree the two limbs may be fused into a single.

Gastromelic.—Are very rare. "They are characterized by the presence of one or two accessory limbs inserted between the pelvic and the thoracic limbs." (Saint-Hilaire.)

Notomelic.—Where there are one or two accessory limbs on the back. In the human race Saint-Hilaire never found a case. He saw it twice in cows.

Cephalomelic.—Where the supplementary limb is inserted on the head.

Melomelic.—Where one or more accessory limbs are inserted on one or more of the normal limbs. This variety is not so very uncommon. It may consist in the addition of a complete limb by a scapula or coxal bone near the normal limb; but often the scapula or coxal bone is lacking, and the accessory limb is confounded with the normal and has the same insertion. In certain instances, the superior segment of the limb is single, the division not beginning till the second segment, the forearm or the leg. Again, the excess in development includes only the hands, feet or fingers.

The upper and the lower extremities may both be thus affected at the same time, and we may observe a certain symmetry in the malformation.

Total doubling of the limbs is rarer.

[A curious instance of this variety we recently had the pleasure of seeing through the courtesy of Dr. W. J. Burnett of Long Island City, in whose practice the child was born. The following is the description which we wrote out at the time: Child, a female, aged thirteen months, with six teeth, and well-formed except as regards the right arm, forearm and hand. There are two humeri, each articulating with a radius and an ulna. In the forearm are three radii and three ulnæ, the central possibly articulating with the inner humerus. There are three hands, each can be moved separately. The inner hand has four fingers and one thumb, the latter always flexed in the hand from absence of the extensor muscle, and on its ulnar surface two rudimentary fingers; the middle hand has four fingers, always contracted, and no thumb; the outer hand has five perfect fingers.

Thus then: Two humeri, three radii, three ulnæ, sixteen fingers, two rudimentary.—Ed.]

Endocymic Fœtuses.—The parasite is only represented by a mass in which traces of fœtal structure may be found. They represent what the ancient writers described under the name of congenital pregnancy, and which to-day are classed among the dermoid cysts.

These deep inclusions have been well described by Verneuil, according to whom there are three periods:

1. A period of stagnation, where its presence is not revealed by any symptom physical or rational. This period is not of long duration. 2. In the second period there are symptoms from the side of neighboring organs, although not suggestive of inclusion. 3. The third period is characterized by purulent inflammation, or by gangrene, and resulting elimination by the intestine, abdomen, etc.

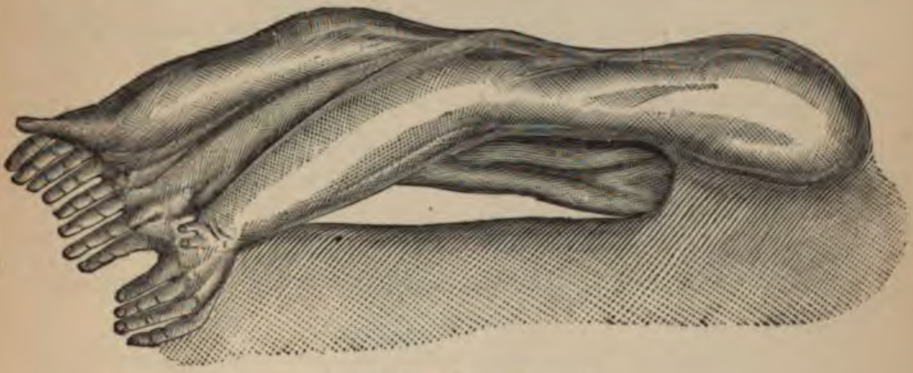


FIG. 240.—PYGOMELE. (*Burnett.*)

During labor perforation is called for.

The prognosis is not, usually, grave for the mother. In 28 cases Paul noted 4 infantile deaths. In a number of instances, the infants have lived many years. Since the tumor may remain indolent, it is apparent that the real danger to the child depends on the site.

Milliaresis reported a case where the included mass occupied the brain.

Triple Monsters.

Only a few instances have been recorded, and of these, some are in all probability apocryphal. The probability is that, in the future, observation will prove that even as there exist double monsters, so there also exist triple, only more rarely, even as triplets are rarer than twins.

GENERAL CONSIDERATIONS ON DOUBLE MONSTROSITIES.

Hohl, Kleinwachter and Veit have, in particular, studied this subject. The latter's monograph contains a *resumé* of the majority of the reported cases.

In 1850 Hohl had collected 96 cases, in 43 of which labor had terminated spontaneously, 4 with difficulty, and 49 by intervention.

Playfair divides double monstrosities, from the standpoint of obstacles to delivery, into four varieties:

1. Two almost distinct bodies, united anteriorly at the thorax or abdomen, throughout a greater or less extent, 19 cases.
2. Two almost distinct bodies, but united back to back in the sacral and inferior lumbar regions, 3 cases.
3. Two heads, with a single body, 7 cases.
4. Two bodies separated below, with two heads united by adhesions or completely fused, 2 cases.

The following general facts may be stated in regard to these monstrosities:

1. As to frequency, they are met with four times in multiparæ to once in primiparæ.
2. Pregnancy rarely goes to term, and therefore, in volume, they are less even than separate twins.
3. Presentations of the pelvic extremity are very frequent.

These monstrosities may be divided into three groups in accordance with the difficulty which they offer to delivery.

a. The obstacle depends purely on excess in volume of the entire body, or of one or another portion, (diprosopi, cephalothoracopagi, dipygi.)

b. Where the fusion is at one or the other extremity of the body, and where, consequently, the monster may be straightened out (craniopagi, pygopagi, ischiopagi.)

c. Where there exists mobility, ease of displacement of each constituent, during delivery, (different varieties of thoracopagi and dicephali). In xyphopagi this mobility is such during intra-uterine life that the two infants may present inversely at the moment of delivery. In case of thoracopagi, artificial displacement is possible. In both instances, particularly in the last, when the head presents, one body may be entirely delivered before the other without separation. (Fig. 241.) Only in case of very pronounced dicephali are we obliged to decapitate.

In case of thoracopagi resort to version.

Altogether, pelvic presentations are very favorable. They are indispensable in case of craniopagi, render delivery easier in case of diprosopi, cephalo-thoracopagi and thoracopagi, and still more so in case of the dicephalus dibrachius.

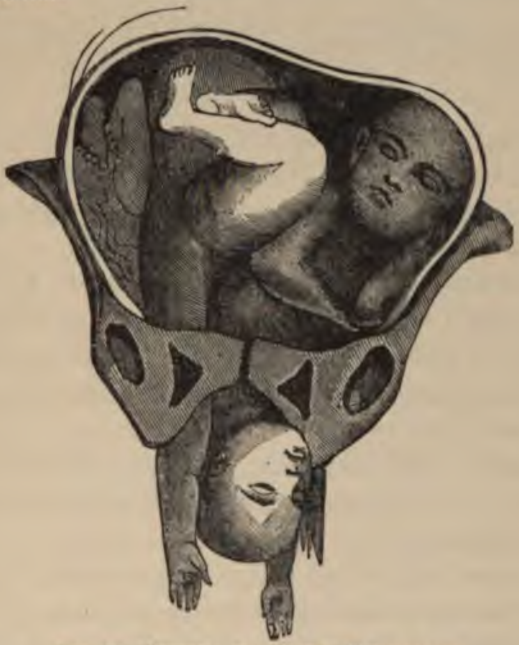


FIG. 241.—DYSTOCIA IN A CASE OF THORACOPAGI.

The craniopagi must present by one or the other extremity. Pygopagi and ischiopagi, when the head presents, require manual intervention for the delivery of the breeches, and when the latter present, one foot must be brought down to decompose the wedge, and allow of the successive delivery of the head.

Dicephalus dibrachius, where the accoucheur is skillful, when it presents by the pelvic extremity, will rarely require embryotomy, because the heads may successively be engaged. When the head presents it may be delivered by the forceps. Ordinarily, decapitation will be necessary.

The dicephalus tribrachius and quadribrachius call for the same management as the thoracopagus when the head presents. In case of the dicephalus tripus, it is the third foot which constitutes the obstacle to spontaneous engagement of the breech.

As a general rule, it is only after delivery that the accoucheur is able to explain the cause of the difficult labor. The absolute rule for treatment should be: Concern yourself, above all, about the life of the mother. Leave the case to nature as long as the condition of the mother allows and then interfere in her interests, resorting to the means which, in the given case, seem likely to injure her the least.

DYSTOCIA DUE TO ABNORMAL PRESENTATIONS OR POSITIONS.

I. *Presentations of the Vertex.*

The vertex may not present regularly with reference to the axis of the superior strait, that is to say, it may be inclined. When slight, this may be considered normal, but when exaggerated, it becomes a cause of delay during the first stage of labor.

If the inclined presentation does not correct itself, but persists, the forceps is indicated to terminate delivery. In case of the face, at times the forceps, at times version, are called for. In case of the breech, the fœtus must be extracted, but intervention is absolutely dependent on the condition of the mother.

The presentation may be normal, and the position abnormal. Especially is this the case in posterior positions, whether of the face or the vertex, when rotation fails.

We must further study in detail those instances where the extremities prolapse in connection with one or another presentation.

a. *Absence of Rotation.—Occipito-posterior Position.*—Occipito-posterior positions, which we have studied at length under the mechanism of labor (*vide* Vol. I.), are far from being rarities, as is proved by the following figures which we take from Sentex's monograph:

Positions.	P. Dubois and Naegele.	Baudelocque.	Boivin.	Sentex.
Occipito-iliac, left anterior,	70%	82%	80%	88%
" " right "	5%	17%	18%	13%
" " " posterior,	27%	1%	2%	2.03%
" " left "	1 in 160			.95%

The observations of Dubois, Velpeau, Villeneuve, Sentex, Wilson, Pajot, prove sufficiently that spontaneous labor is possible in persistent occipito-posterior positions. We are entitled then to wait on nature. But ought we to do so?

Capuron and Macdonald argue for interference; Villeneuve, Sentex and the majority of authorities are guided by the condition of the mother and of the child, and we believe that this is the rule which should guide every accoucheur.

What are the means of intervention at our disposal? Portal, Leroux, Guillemot advise abdominal pressure during the contractions of the uterus. Aside from the fact that this pressure is painful, it will fail, we believe, in the majority of instances, and further it may cause metritis, etc.

Smellie introduced the entire hand in the vagina, and endeavored to push up the head and to turn the face backwards, acting during the contractions.

Burns recommends rupture of the membranes and pressure on the forehead, during the contractions, to push it backwards.

Tarnier has lately proposed to act on the occiput by placing two fingers behind the ear, and thus endeavoring to bring the occiput forward.

Sentex is also a partisan of internal manipulations.

In accord with Simpson, Burns, Cazeaux, Joulin, Depaul, we reject these internal manipulations as being inefficient and useless. Either rotation will occur spontaneously, and we must have the patience to wait a little for this—for we must remember that in many instances rotation is not effected until the head reaches the perineum—or else rotation will not take place, and then both external and internal manipulations will fail, and we must deliver by the forceps, which we much prefer to version.

As to the forceps—for we would reject, with Tarnier, Leischmann and others, the lever—Millot, Levret, Astruc, Solayres, Capuron, Velpeau, Naegelé, Cazeaux, Barnes, Grenser, Schroeder, Sentex, and many others, advise the delivery of the occiput by it posteriorly, without attempting artificial rotation; while Pajot, Smellie, Baudelocque, Simpson, Joulin, Jacquemier, Ramsbotham, Blot, Tarnier and his pupils, advocate artificial rotation. We agree with them, and only in case this is absolutely impossible would we deliver with the occiput posterior. The objections raised against artificial rotation are not tenable, and the experiments of Tarnier and Blot prove that the occiput may be turned completely around without any appreciable lesion of the cord or of the fœtus being produced. (See Vol. IV., under Forceps.)

Unfortunately this rotation is not always possible, and then the occiput must be delivered posteriorly, at the great risk of the integrity of the perineum.

[This subject is considered at length in the next volume under the Forceps. We would simply state here that in the majority of instances the absence of forward rotation is dependent on lack of flexion. Before resorting to artificial rotation, therefore, we would advocate an attempt at flexing the head either by the hand, or else by means of the valuable procedure advocated in particular by Richardson, of Boston, which consists in flexing the head through the forceps applied inversely to the ordinary method, and then removing the blades. In case, after an interval, varying according to the condition of the mother and the child, spontaneous rotation and delivery do not occur, artificial delivery of the occiput posterior by means of the forceps (and here Isaac E. Taylor's slender-bladed instrument is very valuable should be resorted to.—Ed.]

b. *Mento-posterior Position.*—In this case artificial rotation should always and absolutely be attempted. It often fails, however, and then our only resource is perforation, since version is not possible, unless the face is only slightly engaged, in which event, if it can be pushed up version is indicated.

II. *Presentation of the Trunk.*

We have already passed in review the signs and the treatment of presentations of this nature, and we have pointed out that, while external version is easy during pregnancy, the presentation has always the tendency to recur. To prevent this recurrence numerous means have been suggested, and their very multiplicity proves their inefficacy. Convinced that the position of the fœtus is, in these cases, due to lessened resistance of the uterine and the abdominal walls, Pinard has endeavored to reenforce this by means of the following bandage. (Figs. 242, 243.) It consists of three pieces, a right and a left forming the body of the bandage, and an intermediate completing the bandage anteriorly. "When at the eighth month the head is not engaged, the bandage should be applied; when the presentation is of the breech or the shoulder, external version should be performed, and the bandage immediately applied. During the first day, compression should be moderate, and on the following days it should be increased by tightening the posterior buckles."

We have used this bandage, even as has Pinard, Tarnier, Ribemont, Budin, Chantreuil, Champetier de Ribes, but we are not so optimistic in regard to it as is Pinard. It has its disadvantages, such as the necessity of removing it when palpation or auscultation is desired, the inability or unwillingness of many patients to wear it, the fact that, in many cases,

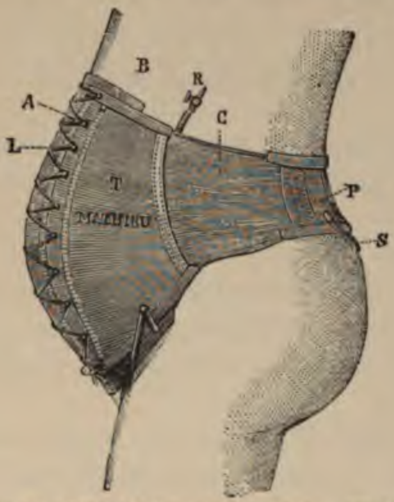


FIG. 242.—PINARD'S ABDOMINAL BANDAGE. Profile.

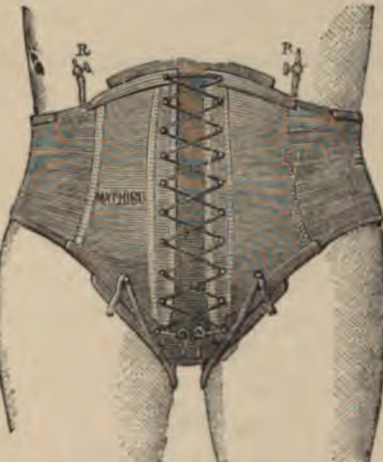


FIG. 243.—PINARD'S ABDOMINAL BANDAGE. Posterior.

since it must be worn night and day, it produces erosions and abrasions of the skin, and becomes a source of torture instead of relief. We would limit its utility, therefore, to the few days which precede the onset of labor.

III. *Prolapse of the Limbs.*

Under the term prolapse, we understand the presence at and above the superior strait of a part of the fœtus which does not belong to the presentation, such as the cord and the extremities. Prolapse of the cord we have already studied.

The above definition eliminates the presence of one or both feet in case of presentation of the pelvic extremity, and of the arms in case of the shoulder. In these instances there is not true prolapse, but only extension of the limbs.

Where prolapse exists, it is usually of an upper extremity. We may meet, by the side of the head, a hand, an arm, the two hands, a foot, and, by the side of the pelvic extremity, a hand or an arm. In certain cases a foot, the two hands, and the cord are found. Frequently, indeed, the cord is prolapsed with the extremities. Rarely, the feet prolapse in case of presentation of the shoulder, although usually this is due to inexpert attempts at version.

The causes are about the same as for prolapse of the cord, except that, while procidence of the latter favors prolapse of the extremities, the reverse does not hold true. They are not very rare. Depaul, in 17,613 labors, noted prolapse of the extremities alone or with the cord 163 times; Lachapelle 45 times out of 15,652 labors, 11 of which were of the extremities. The difference is notable, Depaul 1 in 102, Lachapelle 1 in 1423.

Diagnosis.—We must recognize the fact of prolapse, and then determine which fœtal part it is. The diagnosis is only difficult when the presenting part is above or at the level of the brim, and then careful examination should be made to avoid errors.

a. *Prolapse of one or both Arms by the Head.*—In this event very frequently there is no difficulty. If the liquor amnii escapes but slowly, the hand will ascend as the head descends. If the arm is prolapsed, labor may still terminate spontaneously if the pelvis is normal, if the fœtus is not very large, if the contractions are energetic. According to Credé, all depends on the degree of prolapse.

If the diagnosis is made before rupture of the membranes, the woman must stay in bed. After rupture, attempts at reduction must be made, and the prolapsed part held above until descent of the head. In case of prolapse of the arm reposition will often fail, and then, when dilatation is complete, the forceps should deliver, taking care not to grasp the arm in the blades. Where the pelvis is contracted, perforation may be required. If the head is not at all, or only slightly engaged, version may be resorted to.

b. *Prolapse of one or of both Feet.*—This is rarer than prolapse of the hand, although Depaul noted it 18 times in 278 cases. The attempt must be made to push up the foot, or else the head by traction on the foot, or else resort to the forceps.

c. *Simultaneous Prolapse of the Superior and Inferior Extremities.*—These instances are very rare, and usually only observed in case of dead and macerated fœtuses. Naegelé, in a case where the right arm and the right foot were prolapsed, was able to push up the head, and by pulling on the foot, deliver a living child weighing 8⅘ pounds. Monroe obtained a living child where one foot, the two arms and the cord were prolapsed. Hartmann succeeded where both feet and the right arm were down.

d. *Prolapse complicating Presentations of the Face.*—These are very ominous. Cazeaux saw a case where the presentation was M. I. L. P., the conjugate of the pelvis measured 3 inches, and where the left foot was prolapsed. The forceps failed, as well as attempts to push up the foot. Embryotomy was requisite for delivery.

In 1879 I saw two similar cases while substituting for Depaul at the *Clinique d'Accouchements.* In the one case I perforated. The mother recovered. In the other I performed embryotomy. The woman died. The pelvis in this case was contracted.

e. *Prolapse of the Hand in Breech Presentations.*—This is exceptional, and is not a complication of moment. We will consider it under version. (See Vol. IV.) It is much more common in these instances to see the arms extend over the head during extraction.

Joulin has reported a number of cases of dystocia determined by these different varieties of procidentia.

CHAPTER III.

ERGOT AND ITS USES.

DURING the rainy season, says Jeannel, certain of the flowers composing the pistil of the rye (Fig. 245) undergo a peculiar alteration. A honey-like substance glues together the stamens, and this is the fungus *sclerotium,* which constitutes ergot. The fungus is the result of the germination of a spore of the *claviceps purpurea* (Fig. 247.) The same fungus has been found on wheat by Mialhe. (Fig. 248.)

Physiological Effects.—Without entering into special details, it seems advisable to state briefly our knowledge in regard to the physiological effects of this drug, which are constant, whether it be used as powder, aqueous extract, or as ergotine. Since the experiments of Holmes, in 1869, much has been written on the subject of ergot, and it has been proved over and over again that the drug acts with greatest intensity on the uterine system when gravid, and then on the circulatory, respiratory nervous and digestive systems. In our description we will follow Bailly, who has carefully studied the subject.

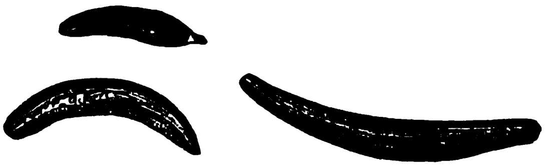


FIG. 244.—ERGOT OF RYE.

The matrons of certain European countries and of America early determined the property of ergot of awakening uterine contractions, but it was first announced to the profession by Desgranges of Lyons (1818-1829), then by Sterns of New York (1818); although Prescott first, in 1815, studied the rapidity and duration of its action, and laid down the indications for its employment.

One of the indispensable conditions for the action of ergot is the development of the uterus and of its cavity under the influence of pregnancy, or of the presence of a foreign body such as a polyp, blood, or vegetations. The uterine fibre must, indeed, be hypertrophied, the muscularis developed as well as the vessels, and therefore it is particularly at full term that the drug acts best and most completely. The further from term, the less the effect of ergot on uterine contractility.

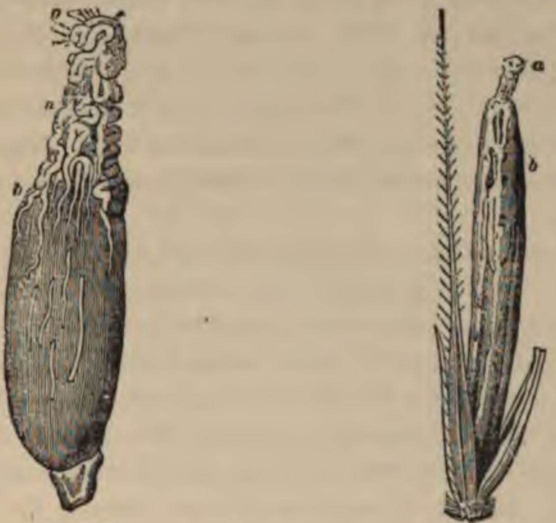


FIG. 245. FIG. 246.

FIGS. 245 and 246.—ERGOT OF RYE. Mature. *a*, Sclerotium. *b*, Ergot. *o*, Mycelial filaments.

A further point is that ergot has the property of over-exciting the muscular fibre already in a state of action. All authorities do not agree that ergot may excite uterine contractions, that the drug is a true abortifacient. The general opinion to-day is that, while ergot may in a measure

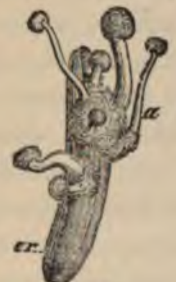


FIG. 247.

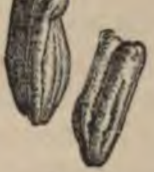


FIG. 248.

FIG. 247.—CLAVICEPS PURPUREA. *er*, Ergot bearing several fungi. *a*, The stem. *b*, The crown.
FIG. 248.—ERGOT OF WHEAT.

excite contractions, it does not suffice of itself to determine labor, and that it is simply an adjuvant to other means of provocation of labor. When, on the other hand, contractility is already present, its action is incontestable; it re-inforces uterine contractions at every part of the uterus, as well the body as the cervix, with an intensity directly proportionate to the development of the uterine fibre. While Prescott denied absolutely the action of ergot on the empty uterus, Trousseau, Maisonneuve, Pidoux, C. Paul, Chapman, Muller, Peronnier, Joffi, Cabini, Pignocca, Bozzoni, Spargani, Laborde, Pitou, admit this, as well as, in a measure, P. Dubois.

Together with this favorable action of ergot, there is another which is unfavorable. The drug, indeed, does not only re-enforce and prolong uterine contractions, but also changes their physiological character by suppressing those intervals of repose which separate the normal uterine contractions. As long as the uterus is under the influence of ergot, it remains in a state of retraction, of tension, tetanic so to speak, which induces uterine and fœtal circulatory disturbances, which are dangerous to the fœtus. Instead of suppleness and resiliency in the intervals of contractions, the uterus remains hard—in a word, as Bailly expresses it, from intermittency, we have remittency.

The action of ergot varies with the different preparations used. When the powdered drug, or Bonjean's ergotine, is administered by the mouth, it is only at the expiration of ten to twenty minutes, as Prescott has observed, that we note the effect, while where the drug is administered subcutaneously, it is at the end of two to three minutes that it is effective. The duration of the action varies from one half hour to one hour and a half, according to the dosage. Yvon's solution has seemed to us to act the soonest, and to be the most transitory of all the preparations.

We have seen that ergot may be dangerous to the fœtus, and further, it may suffice to cause rupture of the uterus. As Jacquemier says, "spontaneous rupture of the uterus is a rare occurrence, notwithstanding the frequent abuse of ergot, and the instances where it has been noted must be explained on the assumption of the presence of alterations in the structure of the uterus, old cicatrices, etc., which weaken the natural resistance of its walls." (Bailly.)

Finally, ergot acts on the urinary system by determining frequent micturition, although the quantity of urine passed is small, accompanied by a sensation of pressure.

It was formerly believed and sustained by Sauvage, Mialhe, Arnal, Hugues (1862), that ergot acted directly on the blood, but this theory is to-day abandoned. Levrat-Perroton, Pereira, Bailly, claim that ergot has a sedative effect on the circulation. The influence of the drug on the heart is not to be doubted. There is slowing of the beats, and Köhler and Eberty have shown that, after the absorption of large amounts, the heart stops in diastole, and remains insensible to all excitation. Seé has also established that the action of the heart becomes feebler, less frequent, at the same time that it becomes regular, in case of irregularity before the administration of the drug. Finally, Brown-Séquard claims that ergot causes contraction of the vessels of the spinal cord, and of its membranes, and so diminishes the amount of blood circulating in these organs.

As Bernard has proved, the blood-vessels may be either contracted or dilated, the tissues around them either relaxed or compressed, and hence a modification in tension of the blood in the different parts of the vascular system.

In 1880, Bailly noted the direct action of ergot on the blood-vessels, and considered it the result of a paralysis of the muscular system of the large arteries. Schneider, Schrenck, Burghardt, Müller, Langius noticed the smallness of the pulse. Spargani, in 1830, claimed that this contraction of the vessels was generalized throughout the entire vascular system. Admitted by Müller, Parola 1844, Boujean 1845, Seé 1846, Levret 1847, Villebrant 1858, Desprez 1860, and later by Gubler, Drasche, Loebel, Döbel, this retraction, this contraction, of the vessels was actually seen by Klebs in 1865, Holmes 1870, and afterwards by Brieseman, Potel, Eberty, Brown-Séquard, Wernich, Vogt, Laborde, Pétou, who showed that the diminution in the calibre was due to contraction of the smooth muscular fibres contained within the coats of the vessels. Authorities, however, are not in accord as to the manner in which ergot acts on this smooth muscular fibre. Some claim that the action is a direct one, such as Holmes, Wernich, Laborde, Pétou. Bernard claims that the action is on the vaso-motor centres. On the other hand, Vogt, Köhler, Eberty, Vulpian, claim that the action on the vessels is secondary through the nervous system.

Since the capacity of the vascular system is diminished, there necessarily results modification in tension. The blood tends to accumulate in the less contracted parts—that is to say, after the administration of ergot, there will be arterial ischæmia and venous congestion in the brain. "If," says Bernard, "we suppose ergotine introduced directly into the vena cava superior or inferior, it will scarcely influence at all these large vessels, for the muscular fibres are few, and separated by a thick internal coat. After having passed through the right side of the heart and the pulmonary artery, the first elements likely to be influenced are the muscular fibres in the pulmonary arterioles. As these contract there will result: 1. Increase of tension in the pulmonary artery. 2. The distension of the right ventricle will hence be more difficult, and the tension will be raised in the vena cava, which will empty themselves less readily. 3. The pulmonary veins receiving less blood, the left heart receives less, and therefore less is transmitted to the aortal system, and there results diminution of tension in both kinds of vessels."

To resume, then, there is increase of tension and congestion in the venous system, and diminution in the arterial. Shortly, however, the ergotized blood will manifest its action on the arterioles of the aortic system; this will transmit less blood to the vena cava system, the tension will increase in the pulmonary veins, until the equilibrium is restored by the cessation of the action of the ergotine.

This modification in tension explains the change in the pulse. Kohler, however, explains the slowing of the heart by an action of ergot on the pneumogastrics.

Finally, ergot also acts on the vessels immediately, by influencing the perivascular tissue. It acts as well on the smooth fibres of the vessels, and on those of other organs, in particular the uterus. As for the mechanism of the contraction, authorities explain it differently. According to Brown-Séquard uterine contractions are subordinate to the vascular contraction. The nerves of the uterus are influenced by the anæmia of the medulla, an anæmia the result of constriction of its vessels. He accepts, hence, the opinion of Oser and of Schlesinger. Wernich also grants this primal medullary anæmia.

Finally, ergot acts on the nervous centres, and Seé has noticed vertigo, pains in the limbs, cramps, feebleness in the lower limbs.

As for the digestive system, the effects of ergot are, at times, nausea, vomiting, great constipation.

INDICATIONS FOR THE ADMINISTRATION OF ERGOT.

Since ergot increases uterine contractility, Bailly has said, "Whenever, whether during labor or the puerperal state, it becomes necessary to increase the contractions of the uterus—that is to say, in uterine inertia during labor or after delivery—the use of ergot is strictly called for." We are in absolute opposition to this opinion of our colleague. While we may grant the use of ergot after delivery, we proscribe it before labor, during labor and before the termination of the third stage. We adopt in its entirety Pajot's law. *As long as the uterus contains anything, be it child, placenta, membranes, clots, never administer ergot.* We reserve it, therefore, purely for uterine inertia after the termination of the third stage of labor. *First empty the uterus of its contents and then give ergot.*

The authorities who advocate the employment of ergot during labor formulate the following rules, and allow it under the following conditions: 1. The cervix should be completely dilated. 2. The membranes be ruptured. 3. The parturient canal be regular in size, or at least large enough to permit the passage of the child. 4. The presentation of the fœtus be such as to allow of the spontaneous termination of labor. 5. Moderate contraction only of the pelvis exists (Bailly alone believes this), and possibly the presentation of the pelvic extremity. (Depaul and Grenser give ergot in case of pelvic presentations, when the breech is about to emerge.) 6. Finally, in case of puerperal hemorrhage, placenta prævia, retention of clots.

Tarnier, in his report to the Academy in 1872, only grants the use of ergot when the cervix is dilated or easily dilatable, the presentation favorable, the pelvis not deformed. He neither advises nor rejects it in pelvic presentations, and decries it more especially in case of hemorrhage during the third stage. Blot says that "the disadvantages are greater than the advantages of using ergot during labor. Afterwards, in case of uterine inertia it is of great value, but it is not the only hemostatic. If we were to compare the cases where ergot has done harm, and those where it has done good, I believe that the first would be far more numerous."

Our reasons, in agreement with Pajot, for rejecting ergot before the termination of labor, are:

1. Ergot is dangerous for the fœtus. The contraction of the uterus de-

termined by ergot is spasmodic, tetanic, maintaining the organ in a state of constant tension, which modifies profoundly the utero-placental circulation. The modification must endanger the fœtus, the more so the more intense and prolonged the action of the drug.

2. Ergot, by inducing uterine retraction, by applying hermetically, as it were, the uterine walls against the fœtus, renders difficult, sometimes impossible, the extraction of the fœtus where it might become necessary, and consequently will thus indirectly compromise the fœtal existence.

3. The action of ergot being exercised on every part of the uterus, on the body as well as on the cervix, may result in retraction of the cervix, and thus militate directly against the end aimed at.

4. During labor the administration of ergot may induce retraction of the cervix on the fœtus, and thus directly interfere with spontaneous expulsion or extraction.

5. For the mother, the tetanic retraction of the uterus, which too often follows the injudicious administration of ergot, means grave dangers by complicating the operations which may be called for to terminate labor. It renders version impossible, except at the risk of rupture of the uterus.

6. Ergot administered before delivery of the placenta may lead to retention of this body, by causing retraction of the cervix. The same is true of clots in the uterus.

7. Finally, ergot administered in case of placenta prævia is far inferior to the tampon, which is the heroic measure.

In Germany, Schroeder "rejects the use of ergot before delivery. It only," he says, "causes spasmodic contractions of the uterus and not normal pains. Further, Schatz, with his Toco-dynamometer, has determined that ergot induces an enormous and continuous elevation of the intra-uterine pressure during the intervals of the contractions, and that while the pains become more frequent, they are less efficient, until at length they cease altogether. Now, it is precisely this alternate relaxation and contraction which is the essential cause of the expulsion of the fœtus, and if ergot defeats this alteration, it can scarcely be called a promoter of labor. Further still, the infant is compromised, for the uterus being in a state of permanent contraction, the interchange of gases cannot take place at the placenta, and the fœtus asphyxiates."

In a word, then, *never give ergot until both child and placenta have been delivered.*

If inertia uteri is present during labor, seeing that ergot is only allowable where the cervix is dilated, the presentation favorable, and the pelvis well-formed, it is much better to use the forceps. In presentation of the pelvic extremity, we much prefer pressure over the head after the method of Kristeller, and, if need be, the extraction of the fœtus. During the third stage, least of all, should ergot be administered. The first thing to do in case of hemorrhage, is to empty the uterus of the placenta and the contained blood, and ergot, by causing retraction of the cervix, may oppose this. Therefore, again, never give ergot as long as the uterus contains anything. The rule is as absolute in case of hemorrhage due to inertia after delivery, but here we give ergot, *but only after the uterus has been emptied of clots.* Finally, there is a further instance where we allow ergot, and this is in case of secondary puerperal hemorrhage, the result of incomplete involution of the uterus.

We limit thus the use of ergot to the hemorrhages of the puerperium.

A number of accoucheurs, and we were once of this number, are accustomed to give ergot to their patients after delivery, with the end in view of assuring permanent contraction, and to avoid hemorrhage. We have for long relinquished this practice as being more harmful than useful. As for the use of ergot in case of after-pains, we do not grant it. By increasing uterine contractions, the after-pains are increased, and it is laudanum, in high dose, to which we resort. Finally, ergot has been recommended as a prophylactic against the puerperal diseases. Jules Guérin has advocated it, but we reject it for the reason that ergot may cause the retention of small clots.

[In the United States, it is safe to say that the great majority of obstetricians, in particular the older ones, will not accept Charpentier's views in regard to ergot. They have been in the habit of administering ergot at any and all times, and have never been able to satisfy themselves that it has ever done any harm, for very much the same reason, we believe, that many of the same obstetricians will tell us that they have never seen a lacerated perineum in an extensive practice. Have they ever looked for the tear of the perineum? Have they ever stopped to consider if some difficulty in labor might not be traced to the ergot which they have given with unsparing hand? It is our belief that the rules laid down for the administration of ergot are golden ones, and our own practice and teaching are fully in accordance therewith. We can conceive of absolutely no condition before the completion of the third stage of labor, where ergot could be of greater service to the mother or child than other measures—massage, electricity, the forceps, version—which do not carry with them the risk that ergot unquestionably does. The real reason, we believe, why ergot is administered by many a practitioner is the hope of thereby saving personal time. Aside from the fact that this is a highly unworthy motive, we would contend that if there is any indication from the side of the mother, or of the child, calling for the saving of time, there is always some procedure at our disposal which will act to better advantage and with greater certainty, without risking the life of the latter, and possibly also of the former. Ergot has been an instrument of greater harm than of good; and much as we prize it after the termination of the third stage, meaning thereby complete emptying of the uterus, and during the puerperium, we feel that rather than use it at other periods of labor, we would dispense with it altogether.

Elsewhere, in these volumes, we have stated the slight points wherein we would disagree with Charpentier's views in regard to the use of ergot in case of placenta prævia, and during the puerperium (Vol. I.).

This work, however, would be incomplete without reference to the teaching and belief of many of the American accoucheurs who have expressed their views in regard to the value and the proper sphere of ergot. The literature of the subject is vast, and we must content ourselves with recording here the latest expressions of opinion on this subject. Engelmann, of St. Louis, and Johnson, of Washington, both claim that such has been and is the injudicious use of the drug, that it would be far better for the woman and her child were it not resorted to at all, if it cannot be used rationally. The late Albert H. Smith, of Philadelphia, thus expressed his views in regard to ergot, in 1883: "I do not believe that it is ever needed under any circumstances, but that it is always capable of doing harm, and generally does harm. Its action is contrary to the action of the law of nature. The more nearly we come to the natural process, the more surely, effectually and safely shall we get our results. We know there is no law of nature more decided in the process of parturition, or more important for the safety of the mother and the child, than that which establishes the remarkable intermittent contraction of the uterine fibre. Ergot, on the other hand, produces a persistent tonic contraction of the uterus, and therefore every practitioner who gives ergot to aid in the expulsion of the child, outrages nature. In the first stage of labor it may be admissible, in extreme inertia and uterine relaxation with dilatable os, if from previous experience we know positively that there is no obstruction to be met with within the pelvic canal, that there is no variation from a normal position or measurement of the fœtus, and that its influence will be followed by immediate expulsion. But I maintain that it is very, very rarely, that we can know the presence of these conditions with sufficient positiveness to guarantee us against death to the child, and death or serious injury to the mother. In the second stage of labor we should never give ergot, because then we can use the forceps, an instrument which is absolutely safe, and with which the intermittent action of nature can be imitated. In the third stage of labor I have seen the very worst effects produced by ergot, *viz.*: a spasmodic contraction of the internal os, with obstinate incarceration of the placenta. In *post-partum* hemorrhage it is an utterly worthless agent."

The above represents fairly well the views of those who are opposed to the use of ergot, except under the condition where it can do no harm, and this is after the uterus has been emptied. Most American authorities favor the drug during the puerperium, for the beneficial action it has on uterine involution. Others, where they know the patient thoroughly, from attendance at previous confinements, do not hesitate to administer ergot in small repeated doses during any of the stages of labor, some to aid the expulsion of the placenta (Campbell of Georgia, Wilson of Philadelphia, etc.), others place their reliance on it chiefly in case of *post-partum* hemorrhage. W. T. Howard, of Baltimore, believes that ergot diminishes to a certain extent the liability to some forms of puerperal fever, by preventing the retention of blood, etc., in the uterus; Reynolds, of Boston, claims that ergot is advantageously given, after delivery is complete, to lessen the liability to after-pains by insuring prompt and thorough uterine contractions, even though these contractions are made, at first, more sharp under its use.

At the last meeting of the American Gynecological Society, Goodman of Kentucky read a paper on the use of ergot after labor, in which he claimed that it should be the invariable rule never to give ergot at the close of the third stage, unless the danger of hemorrhage was imminent, and then hypodermatic injection of ergotine was the preferable method. He stated that the purposes for which ergot was administered were three in number:

To prevent after-pains; to promote involution; to prevent *post-partum* hemorrhage. It was his belief that the only real benefit to be derived from the use of ergot was the prevention of hemorrhage, but that its use was attended with such risks that he did not believe there was warrant for administering it indiscriminately. He regarded the belief that ergot hastened involution as absurd, and although the drug unquestionably averted or arrested after-pains, it did so by setting up an action of the muscles which was not physiological.

In the discussion of this paper, which in certain of its arguments must be considered over-drawn, Reamy, of Cincinnati, agreed practically with the author, stating that from his own observations he was satisfied that the natural state of the circulation in the uterine wall, after the placenta had been delivered, could not be reached if the normal intermittent contractions of the uterine muscle were made persistent. "Ergot not only closes up the uterus, but likewise interferes with the circulation within it, and therefore interferes with the process of involution and must lay the foundation for sepsis. He was perfectly satisfied that more evil is being done to-day by this item in obstetric practice throughout the country, than by any other one thing."

It is thus apparent that there is no lack of variety in the views held in this country in regard to ergot, and yet in one respect there is more or less uniformity, and this is in regard to the fact that the drug administered before the uterus is emptied may be productive of harm. Such being the case, why, we would repeat, resort to it under any conditions where one or another more harmless agent is productive of the desired end?—Ed.]

Method of Administration of Ergot.

Ergot may be administered either in powder, or in infusion, [or in fluid extract.—Ed.] Thus given, however, it is sometimes not tolerated by the stomach, and therefore the attempt has been made to administer it subcutaneously.

Dick, of Berne, has recently studied the comparative action of ergot and ergotine, and states: "1. Ergot acts more rapidly than ergotine. 2. The only difference in regard to ergot by the mouth and ergotine subcutaneously is that the effects of the latter are not so lasting. 3. Uterine tetanus has never been observed after ergotine."

We believe, on the contrary, that ergotine subcutaneously acts more quickly than ergot, and the duration of the action of ergotine is far longer than that of ergot.

The following formulæ for solutions of ergotine are given by Naegelé and Grenser:

℞ Extract of ergot,	ʒ j
Glycerine, dilute alcohol	āā ʒ ij

A Pravaz syringeful will contain 3⅓ grains of ergotine.

℞ Bonjean's ergotine,	ʒ ss
Glycerine, distilled water	āā ℥ ss
℞ Bonjean's ergotine.	ʒ ss
Glycerine,	℥ j

We believe that all the above solutions are likely to cause abscess, and we therefore use Yvon's solution, which has always answered us well. He prepares his solution so that fifteen minims shall contain exactly fifteen grains of ergot, and we are thus absolutely certain of the dosage. From the use of this solution we have never seen abscess. There occurs simply a trifling induration of the cellular tissue at the injection site. Similarly does Herrgott maintain the efficacy and advantages of Yvon's solution administered subcutaneously. In promptness of action it is far superior to any other method of administration; it is perfectly innocuous when the solution has been carefully made. There is never consecutive pain or inflammation. Herrgott has never administered more than fifteen grains. We have given in urgent cases double this dose. We would add that Yvon's solution may as well be administered by the mouth, in the dose of thirty to forty drops, and that when we have used it subcutaneously it has always been well borne, and has never excited either nausea or vomiting.

[The tablet triturates of ergotine, or the hypodermic pellets, if reliable, are excellent forms for the administration of ergot. In case of an emergency, however, a drachm of the officinal fluid extract may be given hypodermatically, provided the precaution is taken to insert the needle deep into the muscles, without fear of resulting abscess. During the puerperium, ergot had better be administered as the aqueous extract, grains five, in suppository, twice or thrice daily, and it may advantageously be combined with a quarter to an eighth of a grain of cannabis indica.

We would mention, finally, that of late years the fluid extract of cotton root (*Gossypii radicis*) has been used to some extent in place of ergot, for the reason that it is said to be just as effective an oxytocic, and yet not to possess the disadvantageous property of causing tetanic contraction of the uterine muscular fibre. We can answer for its marked oxytocic property, but are not in a position to affirm that it is otherwise superior to ergot. We should be inclined to place absolutely the same limitations to its use, for the present, as we believe are applicable to ergot.—Ed.]

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